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Southern California Academy of Sciences

1902

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ERRATA.

Page 74, line 1—For medium, read median.
Page 71, line 1—For medium, read median.
Page 87, line 13—For petals 4, read petals 5.
Page 102, line 29—For habital read habitatal.
Page 103, line 32—For costal read coastal.
Page 103, line 22—For Eucalochortus, read Mariposa.
Page 120, line 8—Before broadly insert petals.
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VOL. I. JANUARY, 1902 NO. 1

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION:
A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER T. B COMSTOCK, Ph. D.

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THE MOON

Original negative taken at the Lick Observatory October 8, 1895, 15h. 6m. 8s.

Moon's age, 20 days and 17 hours.

BULLETIN

OF THE

Southern California Academy of Sciences

VOL. I LOS ANGELES, CAL., JANUARY, 1902. NO. I

INTRODUCTORY.

In the year 1891 some twenty persons interested in scientific lore and research met in a small hall in Los Angeles and formed the Southern California Science Association, subsequently reorganized under its present title, The Southern California Academy of Sciences.

Dr. M. H. Alter called the first meeting to order and was elected president. He was succeeded by Dr. Anstruther Davidson, Wm. H. Knight, W. A. Spalding, Abbot Kinney, and again by Wm. H. Knight, who successively presided over the deliberations of the Academy.

An important officer in a scientific body is the secretary. During the first two years this position was filled by Mrs. Mary E. Hart, but in 1893 the society was so fortunate as to secure the services of Mr. B. R. Baumgardt, who has served in that capacity and been closely identified with the growth and prosperity of the institution from the date named to the present time.

A mere list of the titles of the scientific lectures and papers which have been read before this Academy, either at the general meetings or at its various sctions, during the past decade of its existence, would occupy more space than we shall use in this entire initial number of our Transactions.

Yet many of these papers were of high value, both from a scientific and literary point of view. Some of them have been published in local and eastern journals, thus enriching the archives of science, but many others of high merit have been utterly lost to the world.

To rescue further contributions of value from oblivion, or at least to make a record and synopsis of the themes discussed, is the object of establishing this monthly resume of the Academy's work.

The Bulletin will be issued on the first of the month and will contain advance announcements of the various meetings to be held during the current month, and also a brief account of the proceedings of the meetings of the preceding month. Every member can thus be kept fully apprized of the work of the Academy in all its departments, and need not miss any of the meetings or discussions in which he may be specially interested.

The Bulletin will be under the able editorship of Dr. A. Davidson, who brings to a congenial task an extensive knowledge of general science, and is a specialist of national repute in the science of botany.

The Southern California Academy of Sciences is fortunate in having for its field of investigation an environment which is in many respects unique. It is in a semi-tropic and semi-arid region, traversed by lofty mountain ranges rich in mineral wealth, interspersed with valleys and plains abounding in strange forms of plant and animal life. Two mighty currents of the Pacific Ocean meet off the shores of Los Angeles County, and here are innumerable marine forms which furnish inexhaustible material for the researches of the biologist.

In this broad, virgin field, embracing the great Southwest, are tireless and ardent investigators, and it will be the province of our Academy, through its organized work and through this medium of publication, to gather and preserve to science and to the world the results of their labors.

And now a word to other scientific bodies. We begin the publication of our Transactions with a modest pamphlet of a few pages, but as our society has grown from a membership of twenty to nearly two hundred, so we look forward to a substantial growth of our monthly periodical until it shall be equal in dimensions and usefulness to the scientific journals in the east and abroad. We therefore feel justified in asking all scientific societies to place our Bulletin on their exchange list, and we hope that the benefits arising from this interchange of favors will be reciprocal.

WM. H. KNIGHT, *President.*

A NEW ZAUSCHNERIA.

BY A. DAVIDSON, C. M., M. D.

ZAUSCHNERIA ARIZONICA *sp. nov.*

Stems one to two feet high, decumbent, branching from the base; whole plant villous, not at all tomentose; leaves ovate, one to one and a quarter inches long and half an inch broad, broadly sessile and usually strongly denticulate, feather veined and markedly villous on mid-rib, veins and edges; lower leaves frequently obovate; flowers scarlet, large, one and a half inches long above the ovary; calyx tube cylindrical for three lines above the globose base, minutely villous, lobes three lines shorter than the corolla; style exserted one inch or more; stamens somewhat less; capsule pedicellate, one and one-quarter inches long, slightly villous at base; seeds large, in form resembling those of Z. Californica, var. microphylla, Gray. (Fig. 1.)

ARIZONA: Chase Creek, Metcalf; Aug. 1900, *A. Davidson,* 365. Not uncommon in the moist sand of this rocky creek at 5000 feet altitude. Those found growing on drier ground, though of stricter habit and somewhat less villous, are quite as handsome in flower.

Fig. I. ZAUSCHNERIA ARIZONICA. Natural Size.

Prof. E. L. Greene, in his revision of *Zauschneria* in Pittonia, Vol. 1 :25, is, I believe, correct in classifying them according to the venation of the leaves. Of the feather-veined species two are there described: *Z. latifolia,* Greene, and *Z. tomentella,* Greene. The new species here described is closely related to *Z. latifolia,* Greene, but the flowers are much larger, the leaves more ovate, and the whole plant more villous. When Greene wrote, *latifolia* seemed to have been unknown south of Santa Barbara. All our collections here show it to be quite common in the Sierra Madre and San Bernardino ranges, at from 2000 to 5000 ft. altitude. In the neighborhood of Los Angeles, it descends as low as 500 ft., and in Elysian park it may be found growing in close proximity to *Z. Californica, var. microphylla,* Gray. *Z. latifolia,* as represented here, has , compared with *Z. Arizonica,* long, narrow, lanceolate leaves, seldom more than one-quarter inch broad, flowers smaller, not more than one inch long and having styles and stamens not exserted more than half an inch.

NOTES.

Mr. Rydberg, in the Bull. Torrey Bot. Club, Vol. 28, No. 11, has given a careful revision of the genus *Habenaria,* and following the European custom has subdivided this genus.

It has long been apparent to us here that the plant known as *Habenaria leucostachys,* Wats. Bot. Cal., did not conform to the description given. Rydberg has re-established *H. Thurberi,* Gray, as *Limnorchis Thurberi.* This is the common species here, and is reported also from San Bernardino by Parish and from Fresno by Hall and Chandler. *L. leucostachys,* Lindl., is retained for the plant common in N. Cal., Wash. and farther north.

Of the West American species listed, two are new, viz: *L.Arizonica,* and *L.ensifolia.* In the genus *Piperia* our Californian species as now named are:

Piperia Cooperi, (Wats.), San Diego.

P. lancifolia, Rydb; a new species found on Sierra Santa Monica, by Dr. Hasse.

P. longipetala, Rybd., mountains East of San Diego.

P. multiflora, Rybd., Monterey.

P. elegans, (Lindl); Santa Lucia Mts.

L. longispica, (Durand); Santa Monica and Cucamonga Mts., Monterey.

P. Michaeli, (Greene); San Bernardino Mts.

P. Maritima, (Greene); San Francisco Co.

Those interested in the introduction of the salt-bushes (Atriplex), now so much in demand as a forage plant on alkaline soils will find in Bulletin 27, U. S. Dept. of Agriculture, a complete description of the various seeds most commonly used. The seeds described are beautifully illustrated.

A new shell allied to *Tethys Californicus,* Cooper, was found at San Pedro last summer by T. D. A. Cockerell. It is described in the Dec. Nautilus as *T. Ritteri,* Cockl.

Professor Greene, in the latest Pittonia, Vol. IV, Part 25, describes a wealth of new species from all over North America; many of them it is interesting to observe have been trodden over by eastern botanists for many decades. Among the western additions is a new Crucifer, *Thysanocarpus affinis* from the collection of Mrs. Blanche Trask, Catalina Island.

Dr. Harry Beale Torrey of the University of California is making some studies during the December low tides of the sea anemones with particular reference to their reproduction. He has also looked over the collection of marine hydroids dredged last summer during the session of the San Pedro Biological Laboratory and found about thirty-five forms, over twenty-five of which have not been described.

The subject for the February lecture of the Academy of Sciences will pertain to Libraries. The speaker will be Miss Mary L. Jones, the librarian of our Public Library in Los Angeles.

Prof. W. W. Campbell, Director of the Lick Observatory, will be with us in March and will lecture before the Academy on the second Tuesday of the month. The subject will be announced later.

TRANSACTIONS.

Southern California Academy of Sciences.

Los Angeles, Cal., Dec. 9, 1901.

The regular monthly meeting of the Southern California Academy of Sciences was held this evening at 724 South Broadway.

President Knight occupied the chair.

The minutes of the November meeting were read and approved.

Ten candidates for membership, whose applications had previously, in accordance with the By-Laws, been passed upon by the Board of Directors, were elected into fellowship. Those elected were:

Dr. Robert D. Emery,	Dr. Geo. H. Hull.
Irvin G. Lewis,	Rev. H. K. Walker,
Miss Edith Claypole,	Dr. Geo. L. Cole,
Bishop J. H. Johnson,	Miss Agnes Claypole,
Albert B. Ulrey,	Colton Russell,

Mr. S. B. Parish of Redlands was elected an honorary member of the Academy.

The Secretary read a letter from Mr. A. M. Shields of San Francisco, who desired to donate to the Academy some valuable ornithological and zoological specimens.

A preliminary report of the Leonid meteoric observations, made at Claremont College under the directorship of Prof. E. K. Brackett, was

read. The summary of the observations of meteors for the three years, 1898, 1900 and 1901, was as follows:

	1898.	1900.	1901.
November 14	134	49	137
November 15	172	49	1454
November 16	22	63	5

It will be noticed that no observations were reported by Prof. Brackett for the year 1899. The reason given was the incessant cloudy weather.

Commenting upon Prof. Brackett's report, President Knight expressed the opinion that he considered the Leonid observations made at Claremont College to be the best and most systematic work in this field of astronomy made anywhere in the country.

The Chair called the attention of the meeting to a number of valuable scientific lectures recently given in Philadelphia under the auspices of the Franklin Institute, the Museum of Sciences and Arts of the University of Pennsylvania, and the Academy of Natural Sciences of Philadelphia. Some of the subjects dealt with were: "Divisibility of the Atom," "The Period of a Rod Vibrating in a Liquid," "Molecular Physics," "Cuban Archæology," "Insect Life History," "Excretory Organs," and "Nitric Acid."

The speaker of the evening was then introduced, Mr. Irvin G. Lewis, who presented an interesting paper on

"The South Sea Islands."

The speaker dealt with the topography and geography of the islands and called special attention to the scarcity of harbors and the depth of the ocean between the groups of islands. The atolls and coral formations were described, and the various theories of their formations and growth entered into. Mr. Lewis stated the remarkable fact that the fishes found in the lagoons formed by the atolls were all poisonous, while the same fish found outside of the atolls could be eaten with impunity. The various languages of the natives, their history, their huts and former cannibalism (a subject which the speaker said the natives today avoid referring to), the appalling mortality since they have come in contact with Caucasian civilization, were all dealt with in an instructive way.

A discussion followed, after which the meeting stood adjourned.

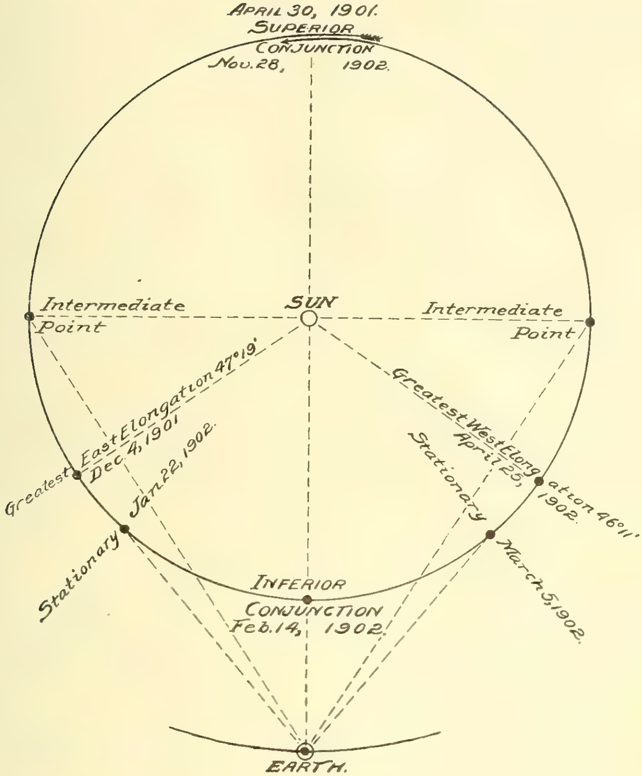
B. R. Baumgardt, *Secretary.*

ASTRONOMICAL SECTION.

The meeting was called to order at the usual hour by Chairman Baumgardt.

A letter to the President of the Academy from Director W. W. Campbell of the Lick Observatory was read to the Section, expressing Prof. Campbell's appreciation of the invitation extended to him by the President to deliver a lecture before the Academy, and making a conditional promise to do so early in the spring.

Chairman Baumgardt then, by aid of a diagram on the blackboard, gave a very interesting and instructive exhibition and explanation of the movements of the planet Venus, now at her greatest eastern elongation, and predicting the dates of her greatest brilliancy, inferior conjunction, and greatest western elongation.



The subject of the Leonids was then taken up and many facts brought out concerning these interesting bodies by Messrs. Knight, Baumgardt, Collins, and others.

Reference was then made to the false report of a comet having been discovered by the weather bureau observer at Chicago, and the explanation of the error offered by Prof. Campbell to the effect that the deceptive appearance of the Pleiades in cloudy weather had probably given rise to the mistake.

President Knight then gave a condensed sketch of the great comets that have been visible during the nineteenth century, and added that it having been about nineteen years since the last great comet appeared, it was near the time when another comet of note should visit the solar system.

President Knight then read a carefully prepared paper relative to the phenomenon of the new star in Perseus, giving credence to the theory that a star in its movements had come into contact with a nebulous mass of sufficient density to offer much resistance, thus giving rise to a great deal of heat and luminosity, both of which would pass away after contact ceased. The discussion of this topic was participated in by several members, after which the meeting adjourned.

MELVILLE DOZIER, *Secretary.*

BIOLOGICAL SECTION.

At the regular meeting of the Biological section, Tuesday evening, Nov. 19th, Miss Edith Claypool of Throop Polytechnic Institute, gave an account of the work of Prof. Simon Henry Gage, Professor of Anatomy, Cornell University.

The account included a reference to his early life, how by hard work he made his way through college and that this capacity for work together with technical knowledge of photography gained then, contributed materially to his eminent success as a teacher of Anatomy.

A review of his published works was given with special reference to "Anatomical Technology" and "Use of the Microscope." Among his original contributions to science his studies on the lake lampreys have been the most valuable.,

A description was given of the laboratories and the laboratory methods used at Cornell University in Prof. Gage's department. He was one of the pioneers in requiring individual work of students in the preparation of histological material for their own studies. Some sets of slides of the normal animal tissues were shown to demonstrate what the average student was able to accomplish in this laboratory.

DR. FRANK GORDON, *Secretary.*

BOTANICAL SECTION.

The regular monthly meeting of the Botanical section was held on Monday, December 23rd, at eight o'clock in the evening, in room 85 Temple block, the usual time and place. The following gentlemen were present: Messrs. Ernest Braunton and H. S. Budd, and Drs. Adolf Kraemer, Carl Schwalbe and Anstruther Davidson.

Most of the evening was occupied in looking over and discussing an extremely interesting collection of Euphorbiaceae submitted by Mr. Budd, and some plants from San Diego, shown by Dr. Kraemer.

Dr. Davidson presented to the section for the herbarium, a new and handsome species of Zauschneria collected by him in Arizona and published by him in this Bulletin as *Z. Arizonica.* After discussing this plant as compared with *Z. Californica,* there being no formal business to be transacted, the meeting adjourned until January 27th, 1902.

LOUIS A. GREATA, *Secretary.*

GEOLOGICAL SECTION

This Section met at the rooms of the Southwestern Miners' Association, Tuesday evening, November 26th, 1901, George W. Parsons, presiding.

The subject for discussion was: "Quicksilver, its occurrence, Production and Uses," by Mr. R. S. Baverstock.

The speaker stated that California had extensive quicksilver resources, San Francisco being the center of the quicksilver producing district. He stated that the principal producing quicksilver district at the present time was San Luis Obispo County, and that Los Angeles capital had awakened to the importance of securing a part of the trade. Mr. Baverstock also stated that a man who had been working Santa Barbara sand for gold, obtained a few flasks of quicksilver which he disposed of

in Los Angeles. He gave a very extensive and interesting description of the process of smelting and distilation of the ores, illustrating the subject by the aid of charts.

He also exhibited some fine specimens of ore from the San Joaquin Ranch in Orange County, as well as from other districts in California.

He stated that mercury is found amalgamated with gold, lead and other metals, and that the supply in Mexico was inadequate to the demand, and that the output in California was decreasing, yet the ore is found in considerable quantities in the counties of Napa, Santa Clara, San Benito, Lake, Trinity, Sonoma, San Luis Obispo, Colusa, Monterey, Marin, Santa Barbara, Siskiyou, Mendocino and some of the other Counties of California.

It is expected that Dr. S. M. Woodbridge will discuss the subject of Nitrates, Phosphates and Potash at the January meeting.

G. MAJOR TABER, *Secretary.*

The December meeting of the section was not held on account of the Southern California Teachers' Association, which held its sessions at this time.

LOS ANGELES, CAL., Dec. 6, 1901.

MEETING OF THE BOARD OF DIRECTORS AT THE OFFICE OF THE PRESIDENT.

A meeting was held this afternoon, with President Knight in the chair.

Those present were, President Knight, Prof. Dozier, Dr. Davidson, Mr. Kinney and Mr. Baumgardt.

The President announced the subject for the next general meeting of the Academy.

Nine new members were elected, as follows:

Robert D. Emery, O. D.,	Colton Russell,
Irvin G. Lewis,	Miss Agnes Claypole,
Miss Edith Claypole,	Geo. L. Cole, M. D.,
Bishop J. H. Johnson,	Rev. H. K. Walker,

Albert B. Ulrey.

On a motion of Dr. Davidson, Mr. S. B. Parrish was recommended for honorary membership in the Academy.

It was moved by Prof. Dozier that the Chair appoint a committee of three on publication. Carried.

Action on publishing Mr. Parrish's Botany of Southern California was postponed to the next meeting of the Board of Directors.

Adjourned.

B. R. BAUMGARDT, *Secretary.*

LOS ANGELES, CAL., Dec. 10, 1901.

MEETING OF THE BOARD OF DIRECTORS AT THE OFFICE OF THE PRESIDENT.

A meeting was held this afternoon. Members present were Messrs. Davidson, Campbell, Johnson, Dozier and Baumgardt.

In the absence of President Knight, Prof. Dozier was elected to act as chairman.

The Secretary presented the name of Dr. Geo. S. Hull of Pasadena for membership, which application was passed upon favorably.

Adjourned.

B. R. BAUMGARDT, *Secretary.*

CALENDAR OF MEETINGS FOR THE MONTH OF JANUARY.

January 7.—Meeting of the Astronomical Section at 724 South Broadway. Subject: "The Metric System," by Prof. Melville Dozier.

January 14.—Meeting of the Academy at 724 South Broadway. Subject: "Landscape Gardening and Floriculture," by Mr. Ernest Braunton, editor of the California Floriculturist. The lecture will embrace the effect of gardening upon civilization, its history and development, rules for landscape gardening, the right and wrong ways and the dictates of nature, California gardening in general and Los Angeles in particular, the planting and care of trees, shrubs and plants, floriculture in general and the rose in particular. The subject will be illustrated with charts showing several economic and artistic ways of laying out an ordinary city lot.

January 21.—Biological Section will meet at the State Normal School.

January 27.—Botanical Section will meet at room 85, Temple block.

January 28.—Geological Section will meet at the Southwest Miners' Association rooms, First and Main streets.

VOL. I. FEBRUARY 1, 1902 NO. 2

BULLETIN

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Calendar for February, 1902.

Feb. 4 Astronomical Section meets at 724 South Broadway. Illustrated lecture by Prof. Edgar L. Larkin, of the Lowe Observatory. Subject: "Spectrum Analysis." The lecture will include Recent Research in Radiant Energy and the Search for Zero Temperature.

Feb. 11. General meeting of the Academy. Lecture by Miss Mary L. Jones, Librarian of Los Angeles Public Library. Subject: "The Library Historically and Locally Considered," to be preceded by a brief paper on "Modern English" by Mr. A. L. Bancroft.

Feb. 18. Meeting of the Biological Section at the State Normal School. Lecture by Dr. Albert B. Ulruy. Subject: "Some Practical Suggestions on the Study of Biological Problems of this Region with Special Reference to Animal Ecology.

Feb. 24. Meeting of Geological Section at the Southwest Miners' Association, First and Main streets. Lecture by Dr. S. M. Woodbridge. Subject: "Phosphate and Other Deposits in New Mexico Suitable for Fertilizing."

Feb. 25. Meeting of Botanical Section at 85 Temple Block. There will be a report by Mr. Louis A. Greata, on a Collection of Northern Plants.

N. B. All the meetings commence at eight o'clock in the evening.

Fig. 2. Aster Greatai, ⅔ Natural Size.

BULLETIN

OF THE

Southern California Academy of Sciences

VOL. I LOS ANGELES, CAL., FEBRUARY 1, 1902. NO. 2

Aster Greatai.

sp. nov.

By S. B. Parish, San Bernardino, Cal.

Stems erect or assurgent, 4 17 dm. high, glabrous, or above sparsely hirtellus; leaves thin, ovate, oblong-lanceolate, or lanceolate, 6-15 cm. long, the scabrid margins few-toothed, and the base clasping, the uppermost usually reduced to linear or linear-lanceolate bracts; heads (5 mm. high by 10 mm. wide) in an ample panicle; involucral scales loosely imbricated in a few series, lanceolate, green, minutely ciliate; rays 30-40, light purple, narrow, acute, 5-10 mm. long; achenes hirsute. (Fig. 2.)

Acton, *Dr. Hasse*, Canyons of the San Gabriel Mts., near Pasadena; *McClatchie*, Sept. 1892; *L. A. Greata*, Sept. 1900, (type); Mr. and Mrs. Grout, Sept. 1900.

A handsome species of the *Vulgaris* section, and near *A. Fremonti*, Gray. The recognition of it is due to Mr. Greata's notes and excellent specimens, and it fittingly may connect his name with the flora of which he is so earnest a student.

[This issue mailed Jan. 31, 1902.]

November Leonids of 1901.

REPORT OF OBSERVATIONS MADE BY PROF. F. P. BRACKETT AND ASSISTANTS AT POMONA COLLEGE, CLAREMONT, CAL.

Volunteers from the Astronomy Class maintained a systematic watch on the mornings of November 14th, 15th and 16th, from midnight till daylight. The watch was divided into half-hour periods, for each of which two or more observers were responsible.

On the morning of the 14th, 137 meteors were seen, of which only 57 were positively identified as Leonids.

On the morning of the 15th, 1449 meteors were seen, of which only 22 were indentified as *not* being Leonids.

A fog on the morning of the 16th precluded observation.

Of the 1449 meteors observed on the 15th, 1130 were seen in the two hours from 3:30 to 5:30 a. m., being at the rate of 9.4 per minute.

Between 4:30 and 5 a. m. their frequency amounted almost to a veritable shower. During that period 400 meteors were seen—falling at the average rate of one for each 19 seconds, though at some portions of that interval several meteors were seen moving across the sky at the same moment.

About one-quarter of the meteors were of the first magnitude or higher. About half were of the third magnitude or less.

The prevailing color of those under third magnitude was white, while that of the higher magnitude was orange. A few green and blue ones were seen.

The length of the path was usually proportional to the magnitude of the meteor.

Several meteors were seen to burst and scatter. Three left trails which were visible for a long time, one of them about 20 minutes.

The very excellent, elaborate and painstaking report above epitomised, covers 38 pages of descriptive and tabular matter, and reflects great credit upon Prof. Brackett and his assistants, Messrs. Ludden, Moles, Venhuizen, Bert and Reynolds, and Misses Craig, Wolcott and Rice. It is a valuable contribution to meteoric astronomy. WM. H. KNIGHT.

Notes.

A complete summary of the last season's work of the San Pedro Biological Station of the University of California is made by Dr. W. E. Ritter in *Science*, Jan. 10, 1902.

Prof. W. W. Campbell, Director of the Lick Observatory, will lecture before the Academy at the March meeting.

"Last July, at Downey, Los Angeles, County, California, I had an opportunity to examine an orange orchard. I was greatly interested to find *Mytitaspis beckii* (which, it used to be said, would not live in California) excessively abundant and injurious on the leaves and fruit. On the same trees the old California pests *Saissetia oleæ*, *Aspidiotus aurantii* and *Icerya purchasi* were also present, but in such insignificant numbers that all three combined would not do any appreciable damage. I had difficulty in getting enough of the *Icerya* for certain identification. I do not know how widespread this condition of affairs may be; Dr. Howard, to whom I mentioned it, told me it was new to him."—T. D. A. COCKERELL, in Entom. News, Jan., 1902.

The Chayote, a tropical vegetable of the gourd family, said to be superior to the summer squash and vegetable marrow of cultivation, is recommended in Bulletin No. 28, U. S Dept. of Agricult., as a probable valuable food plant for Californians. It has been grown at Santa Barbara for some years and is a rapid growing vine with an abundance of flowers that produce much honey.

The *Delphiniums* of the west threaten to become as much of a puzzle to our botanists as the blackberry bush was to the English. Miss Alice Eastwood (Torrey Bulletin, Dec. 1901) discusses *D. decorum*, and its allies, and, by way of elucidation, adds three new species and two varieties, all native of northern and middle California.

The Academy of Sciences of Southern California aims to make its Bulletin the best representative magazine of its kind in the west. To fully attain this end we require and desire help from all workers in nature's field. The entomologist, zoologist, geologist and botanist will be accorded space for any article of scientific value; if illustrations are forwarded these will be reproduced without any expense to the writers. Lists of species and additions to lists already published always prove useful to investigators.

Quite a respectable number of new species have been added to the flora of the west during the season just passed. We have made arrangements to present one or two of these with illustrations in each succeeding number of the Bulletin.

Mr. Henry Skinner (Entomological News, Jan. '02) describes two new butterflies from California. *Lycaena neurona*, from Doble, San Bernardino county, and *Lycaena chlorina* from Tehachapi.

In the Journal of Malacology, 1901, Vol. VIII, pt. 3, Mr. T. D. A. Cockerell reports three new Nudibranchs from California. *Coryphella cooperi* and *Facelina stearnsi*, from San Pedro; and *Thecacera velox*, from La Jolla, San Diego county.

Volutomitra Alaskana, a new deep water shell ranging from Alaska to San Diego, is described by Mr. Dall in Nautilus, January, '02.

Transactions.

ACADEMY OF SCIENCES.

The regular meeting of the Academy of Sciences was held in Ebell Hall January 14th, 1902. President Wm. H. Knight called the meeting to order. The Secretary, Mr. B. R. Baumgardt being absent, Mr. G. Major Taber acted as Secretary pro tem.

Mr. Ernest Braunton, editor of the "California Floriculturist," was introduced as the speaker of the evening, his subject being "Landscape Gardening and Floriculture."

The speaker took a broad and scientific view of the subject, and said in part:—"That the effect of gardening on civilization had been very marked. That Lydia had been famed for her gardens 2000 years before the Christian era, as also the hanging gardens of Babylon which Nebuchadnezzar made the wonder of the world. The study of the picturesque was the order of the day down to 600 years B. C.

He stated that Ptolemy laid out magnificent gardens at Alexandria containing avenues, statuary and fountains, and that the Greeks were noted for their art in landscape gardening.

The speaker advocated following as near to nature as possible, and remarked that A. J. Downing, the pioneer of landscape gardening, assisted by Fredrick S. Umstead, laid out the Central Park in New York City, and that it was one of the most beautiful parks in the world. He spoke very highly of the Golden Gate Park of San Francisco.

The speaker laid down three rules as underlying principals, that of preserving open lawn centers, planting in mass, and avoiding straight lines.

He made the assertion that California had not yet developed a system of her own, but had imitated eastern methods, and that Prof. Bailey was in favor of California adopting a distinct method, owing to her superior advantages of climate. He asserted that the possibilities in Los Angeles were greater for landscape gardening than in any other country, and yet they were far behind many of the eastern cities, and that many of the eastern nurseries contained a greater variety of plants and flowers than could be found in our own nurseries here. He stated that the trees and shrubs bordering the streets were not the best adapted for the purpose. The speaker criticized the unartistic design of the 6th Street Park, and suggested the planting around the Park a hedge to make it more secluded. For shade trees for the roadside, he preferred the Sterculia Diversifolia, sometimes called the "Bottle Tree."

The speaker took up the subject of the cultivation of the Rose, giving direction as to pruning, watering and fertilizing, going into the subject very thoroughly. During his remarks he called the attention of the audience to several designs of lawns, explaining the rules governing the artistic points in the laying out of them.

The President in a few appropriate words, thanked the speaker in the name of the audience for his interesting lecture.

G. MAJOR TABER, Sec'y pro temporary.

ASTRONOMICAL SECTION.

Jan. 7th, 1902.

The section was called to order at the usual hour by Chairman Baumgardt, and the minutes of the last meeting read and approved.

The chairman announced that Director Campbell of the Lick Observatory, expected to deliver a lecture before the Academy of Sciences at the regular meeting in March next.

He also called attention to the fact that the planet Venus is now at its maximum brilliancy, and would henceforth rapidly approach the Sun, disappearing in his rays on the 22nd of next month, shortly after which she would appear as a Morning Star. The paper of the evening was then read by Mr. Melville Dozier, being a brief summary of the defects of the present system of weights and measures in use in this country and Great Britain, followed by a concise history of the construction and adoption of the Metric System, together with an exposition of its remarkable advantages over the common system; the simplicity and comprehensiveness of the system being illustrated by use of the blackboard. The paper was followed by a discussion of the comparative merits of the systems and the question of the compulsory use of the Metric System in the United States. It was resolved that the Academy be recommended to adopt a resolution asking Congress to pass a law making the use of the Metric System compulsory in all governmental business. The meeting then adjourned.

MELVILLE DOZIER, Secretary.

BIOLOGICAL SECTION.

At the January meeting a paper was read by Dr. C. A. Whiting on "Some Problems of Nutrition."

The paper discussed the nature of the food principles and their changes by means of the digestive ferments. Particular attention was given to the role of proteids in nutrition, and how, under certain conditions, they may supply deficiencies in carbohydrates. Proteids are the tissue formers, while fats and carbohydrates are the energy producers of the human body.

The paper was illustrated by blackboard diagrams of processes and chemical reactions.

The discussion which followed brought out a review of Dr. Loeb's recent experiments on the vitality of the cell.

DR. FRANK GORDON, Secretary.

GEOLOGICAL SECTION.

The Geological Section met in the rooms of the Southwest Miners Association on Tuesday evening, January 28th. The attendance was large, including a delegation from Dr. F. Lee Fuller's Y. M. C. A. Class in Mining and Mineralogy.

In the absence of Chairman Geo. W. Parsons, Mr. Wm. H. Knight presided. The minutes of the preceding meeting of the Section were read by the Secretary and approved.

The meeting was addressed by Mr. Fred H. Brown on "Detecting the Presence and Locating the Position of Ore Bodies in Mineral Veins by Electricity." It was interestingly illustrated by means of electrical apparatus, numerous charts and blackboard diagrams.

Mr. Brown said that the principle involved is the well-known law that an electrical current always seeks the path of least resistance. The metals are good conductors, while the earth is a poor conductor and offers a comparatively high resistance. If a current is sent from a point A to a point B, 500 feet distant, and the resistance recorded by the ohm-indicator is, say 1000 ohms, while a currant sent from A to point C in another direction encounters a resistance of only 200 ohms, the inference is that somewhere below the surface between A and C there is a body of metallic ore offering a low resistance to the current. By repeated cross-sectional surveys the depth and position of the ore body can be approximately determined.

Beautiful experiments, illustrating the principles involved were made with copper fillings, with a mass of galena two feet in diameter, and with a chalk-like substance which proved to be nearly a non-conductor. Mr. Brown was assisted in his experiments by Messrs. J. A. Shelhamer and Wm. D. Kelly. An animated discussion was participated in by Messrs. J. H. Dockweiler, G. Major Taber, E B. Avery, W. W. Webster of Pasadena and others.

G. MAJOR TABER, Secretary.

VOL. I. MARCH 1, 1902 NO. 3

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION:

A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER T. B COMSTOCK, Ph. D.

CONTENTS:

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Spiral Nebula in Canis Venatici, from photograph taken with the Crossley Reflector at the Lick Observatory, May 10, 1899. Exposure, 4 hours. Illustrating the genesis of suns and worlds.

BULLETIN

OF THE

Southern California Academy of Sciences

VOL. I LOS ANGELES, CAL., MARCH 1, 1902. NO. 3

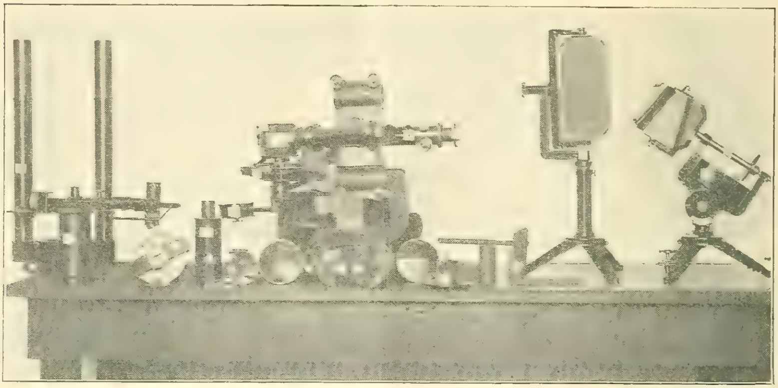
The New Spectrograph at the Lowe Observatory.

BY PROF. EDGAR L. LARKIN.

DIRECTOR OF THE LOWE OBSERVATORY

The Lowe Observatory is now receiving a fine new spectrographic outfit through the kindness of generous donors. Two ladies, tourists from Allegheny, Penn., called at the observatory. They desired to see the solar spectrum with the *Fraunhofer*. They were shown and explained, as best might be, with the home-made, wood-mounted heliostat. They saw this remarkable revolving mirror and asked if it was the only heliostat in the observatory. Being informed that it was, they called for pen and paper and immediately made an order on the Brashear Optical Co. for a new one, to order, the finest made. This cost $123.00. It is here and is a marvel of precision and beauty; its polished mirrors are of exceeding brilliancy. They since have asked what more was needed to render the Lowe Observatory able to enter the list with others in original research. They were informed that a spectrographic outfit was necessary to do work on current lines of astro and solar physics. This was ordered and is now being made by Brashear. The names of these liberal and intellectual women who are doing so much here and elsewhere in aid of science are the Misses Jennie M. and Matilda H. Smith. They said they were not "society" women.

[This issue mailed March 3, 1902.]



THE NEW SPECTROGRAPH OF THE LOWE OBSERVATORY

The cut shows a photograph of the spectroscopic apparatus now in the observatory. The new spectrograph is not here—probably will be in April. The two instruments to the right are Nos. 1, 2, 3, the heliostat, and 4 is another mirror to reflect the band of light elsewhere if desired. The axis (2) of the heliostat is parallel to the axis of the earth, the brass box (1) contains a double clock which turns the mirror 3 upon which the sun shines, to keep up with the rotation of the earth. This keeps the light as long as required on a straight line entering the slit of the spectroscope (5). The rays pass through the collimator (6) to the defraction grating (7), which disperses the band into a magnificent spectrum of gorgeous colors, crossed with over 4200 Fraunhofer lines. These lines can be read as a telegraphic dispatch and constitute the language or alphabet of the universe. The grating, ruled with a diamond 14,438 lines to the inch, reflects the light through the lens (8) to another lens (at 9), where the eye is placed. But the telescope (8), (9), is to be replaced by the new spectrograph, which will take photographs of all that appears on the grating. The entire instrument will rank with the finest in the world. The other instruments shown cannot be explained here for want of space.

Fig. 3. Scrophularia Glabrata. (Natural Size.)

Scrophularia glabrata, sp, nov.

BY A. DAVIDSON, C. M., M. D.

Perennial light green glabrous; the whole upper part of the plant studded with microscopic glands: stems slender, two feet high, much branched: leaves ovate lanceolate, coarsely dentate. 1 to 1½ in. long accuminate at apex, narrowed at base, not prominently nerved, petioles ½ in. long; flowers dull purple in almost leafless thyrses averaging 6 in. in length; bractlets mostly opposite, slender ascending; calyx ovate, acute shorter than the tube; corolla dull, purple not contracted, upper lip erect, lobes rounded, sterile stamen obovate purple; capsule ovate acute—ARIZONA. Mountain streams at Metcalf at 4000 to 5000 ft. alt. (Fig. 3).

This species is readily distinguished from all other Scrophulariæ by the shape of the leaf and the total lack of hairs on any part of the plant.

The Genus Dirina in North America.

BY DR. H. E. HASSE.

In 1872 Tuckerman wrote (Gen. Lich. p. 130), "It (Dirina) has not yet occurred nearer to the North American continent than the Sandwich Islands." It will hence be of interest to Lichenologists that this Lichen, hitherto known from the English and Mediteranean coasts, from Chili, Japan and Sandwich Islands, has now been found to be represented by two new species on this continent, both occurring within the boundaries of Los Angeles county. Dr. A. Zahlbruckner, of the Botanical Department of the Royal Museum of Vienna (the author of our species), alluded to the circumstance that, true to the predilection of this Genus these two species likewise favor a maritime habitat, conforming herein to *Roccella*, to which, according to the views of recent authors, *Dirina* is allied. This view has been foreshadowed by Tuckerman (l. c.) and others.

Dirina rediunta (Stiz.), Zahlbr., was found by the writer in 1895 on Catalina upon the bark of Heteromeles arbutifolia, and since also on the mainland upon the California Walnut and

Quercus agrifolia. The late Dr. Stitzenberger recognized it as a n. sp., placing it under *Lecanora*. Subsequently Dr. Nylander, in view of the dark brittle hypothecium, transferred it to *Lecidea* as *L. sublugens* Ngl. It has now been recognized by Dr. Zahlbruckner as a true *Dirina*. Ann. K. K. Natur. Hist. Hofmus. xvii. 81. Vienne, 1901.

Dirina hassei Zahlbr. n. sp. Bull. Torr. Bot. xxvii. 644, 1901. The original, and so far only known, station on the beach near Santa Monica, on bark of Rhus laurinum.

It is not improbable that further search along our coast and adjacent islands may be rewarded by the discovery of other species of *Dirina*.

Silvery Footless Lizard or Snake.

Aniella pulchra. Gray, Ann. and Mag. Nat. Hist.
Aniella nigra. Fisher, Abh. Nat. Verein Hamburg (Var.)

BY PROF. J. J. RIVERS.

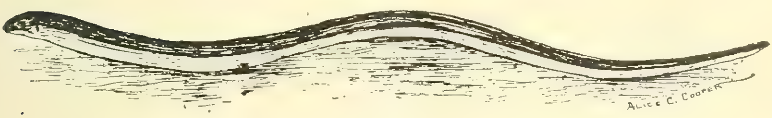


Fig. 4. SILVERY FOOTLESS LIZARD. (⅔ Natural Size)

An anatomical digest of the relationship of Aniella to other Lacertians is to be found in the U. S. Natural Museum Reports, Vol. 17, page 345, by Dr. Baur. This lizard inhabits the sand dunes from Marin county to San Diego, Cal. Its food consists of larvae of insects, its time of activity is during the night when many species in the larval form are seeking their vegetable food. Both the reptile and the insect are invisible during the day as both have the habit of burrowing for the purpose of concealment. But prowling in the dark does not ensure safety for the vegetable feeder succumbs to the insectivorous and the insectivorous become the prey of the birds of the night.

Ocean Park, Santa Monica.

Notes.

We have received from Dr. L. G. Yates a reprint from Bulletin 3 of the Santa Barbara Natural History Society which contains a list with the known localities of the Marine Algae of Santa Barbara county. The list is somewhat smaller than we would have anticipated and further investigation will probably add many other species to the number.

Students of Mycology will be charmed by the illustrations in Bulletin No. 3 of the Lloyd Library, Cincinnati. Mr. Lloyd particularly desires ripe specimens of Earth stars and Puff-balls from anywhere and everywhere. Any specimens sent will be gratefully received and duly acknowledged.

The California Academy of Sciences has recently acquired a specimen of the Elf Owl from near San Bernardino and a Rivoli hummingbird from the San Gorgonio Pass—both first records from California. Auk, Vol. XIX, No. 1.

Books, Pamphlets, Etc., Received.

The Journal of the Cincinnati Society of Natural History, Vol. Nos. 1 and 2.

Missouri Botanic Garden Reports, Vols. 11 and 12.

Bulletin of Department of Geology of the University of Cal., Vols. 1 and 2.

Publications of the U. S. Dept. of Agriculture for sale by the Superintendent of Documents. Corrected to July 1, 1900.

Suggestions to prospective forest students. Circular 23, U. S. Dept of Agriculture, Bureau of Forestry.

Report of the Forester for 1901, U. S. Department of Agriculture.

Bulletin of the New York Botanical Garden, Vol. 2, No. 6.

Experiment Station Record, U. S. Dept. of Agriculture. Vol. XIII, No. 5.

Proceedings of the Thirteenth annual meeting of the Association of Economic Entomologists.—U. S. Dept. of Agriculture.

Transactions.

ACADEMY OF SCIENCES.

The regular meeting of the Academy was held at Ebell Hall Feb. 11, 1902. President Wm. H. Knight called the meeting to order. In the absence of Secretary B. R. Baumgardt, Mr. G. Major Taber acted as secretary pro tem.

The following persons were elected to membership in the Academy: Dean William T. Randall, Prof. James H. Hoose, and Paul Arnold, of the University of Southern California; Miss Alice G. Cooper, Miss Louise Lyde, Dr. D. L. Tasker, and Dr. Fred L Brown.

A paper contributed by Mr. A. L. Bancroft, was read by Prof. Melville Dozier. Subject: "Modern English from the Standpoint of Usefulness." The author proposed a revision, enumerating the advantages that would result from the adoption by all the English speaking nations of the phonetic system. Prof. Dozier moved that the paper be referred to a Committee of Three for further consideration by the Academy.

The President then introduced Miss Mary L. Jones, City Librarian, who addressed the meeting, her subject being "Libraries, Historically and Locally Considered." Miss Jones gave account of some of the first libraries established in this country, stating that Benjamin Franklin organized the first subscription library at Philadelphia in 1731, and from that effort public libraries had been established all over the country. The speaker explained the decimal system of classifying books and other interesting features of modern library work. She stated that more books were read from the Los Angeles Library in proportion to its population, than is the case in any other city in the United States. She favored locating the newspaper reading rooms in the new Chamber of Commerce building, thus making more table room at the Public Library for book users The speaker deprecated the too frequent changes in the personel of the library board as detrimental to the best interests of the institution.

G. MAJOR TABER, Secretary pro tem.

ASTRONOMICAL SECTION.

The meeting was called to order by Chairman Baumgardt, and the minutes of the last meeting were read and approved. The Chairman again called attention to the approaching transition of Venus from an evening to a morning star, and to the proximity of its conjunction with the Sun.

President Knight referred to a paragraph from the pen of Prof. Kapteyn, published in a European journal, relative to a theory accounting for the new star in Perseus. Mr. Knight compared it with his own theory as stated before the section at the December meeting.

The lecture of the evening was then delivered by Prof. Larkin director of the Lowe Observatory, being an exposition of the nature, law, and practical applications of Spectrum Analysis. Prof. Larkin, by the aid of many diagrams, illustrated the development and the construction of the spectroscope, and gave a most lucid and instructive account of the important discoveries due to its use, and of the invaluable place it occupies in astronomical investigation and calculation. The evening was one of unusual profit and interest.

MELVILLE DOZIER, Secretary.

BIOLOGICAL SECTION.

Los Angeles, Cal., Feb. 18, 1902

Prof. Ulrey of the University of Southern California, addressed the Section. He gave an interesting sketch of the history of Biological research. Beginning with Aristotle, he traced the evolution of the science through Pliny, Wotton, Linaeus, Lamarck, Lyell and Agassiz.

Finally, he said the researches and convincing arguments of Darwin and Wallace gave us "Natural Selection." These in their turn were followed by Weissman who opposed the idea of acquired characters being inherited.

The comparatively new line of research in experimental embryology and comparative physiology is well illustrated by the experiments of Roux. He destroyed one part of the developing egg of the frog and the remaining part developed, first into a half embryo and later this half produced the whole animal.

Herbst showed that by changing the composition of sea water, sea urchins' eggs wonld develop into a form very different from the species from which it came. Loeb's researches are along the same lines.

Some of the problems suggested for local study were: (1) Variations under known environment. (2) Inheritance of acquired characters. (3) Hybridization. (4) Effects on developing embryos of abnormal conditions. (5) Regeneration experiments.

Besides this, such pioneer work should be carried on as: (1) making lists of species in this region with particular reference to the data of their environment and (2) distribution of certain forms and their abundance.

In the discussion which followed plans were considered as to these practical lines of work which the section might undertake.

GEOLOGICAL SECTION.

Los Angeles, Feb. 25th, 1901.

The Geological Section met at the rooms of the Southwestern Miners' Association, at 8 p.m. In the absence of Chairman Parsons, President Wm. H. Knight called the meeting to order. The minutes of the last meeting were read by the Secretary and approved.

Mr. Wm. Hodgson placed on exhibition a number of bones found on the desert some sixty miles from Mojave, which were apparently fossils of gigantic animals belonging to a previous geological era, also several Indian relics found in that vicinity.

Mrs. Mary E. Hart gave a brief sketch of her mining experience at Nome, having lately returned from that section. She exhibited a collection of photographs of the inhabitants of Alaska, also of reindeer and other curiosities, also samples of tundra, moss which comprises almost the exclusive food of the reindeer, Alaska cotton, and samples of gold dust. Her report of that section was full of interest. Capt. J. J. Healy and Col. A. B. Hamilton of Seattle, formerly Alaska miners, were present and added much to the interest of the occasion with their reminiscences. The section then adjourned.

G. MAJOR TABER, Sec'y.

BOTANICAL SECTION.

The proposed meeting was postponed on account of the inclemency o the weather.

L. GREATA, Secretary.

BOARD OF DIRECTORS.

A meeting of the Board of Directors was held in the office of the President. A full quorum was present.

Seven applications for membership were passed favorably. The names of the applicants were as follows: Dean W. T. Randall, Miss A. G. Cooper, Miss Louise Lyde, Prof. J. A. Hoose, Paul Arnold, Dr. D L. Tasker, Fred Brown.

The offer of Prof W. W. Campbell, Director of the Lick Observatory, to lecture before the Academy at the regular monthly meeting in March was accepted and the Secretary instructed to make arrangements for a hall of sufficient capacity for the occasion.

Bills to the extent of $45.65 were passed.

There being no further business the meeting stood adjourned.

Secretary.

Calendar for March.

March 4. Astronomical Section meets at 724 S. Broadway. Informal talk on the International Date Line, introduced by Mr. Melville Dozier.

March 11. General meeting of the Academy at the Ebell Hall, Broadway. Lecture by Prof. William Wallace Campbell, Director of the Lick Observatory. Subject: "The Motion of the Solar System." Illustrated with numerous lantern slides. Also a few slides showing the nebula surrounding Nova Persei, and slides of photographs of nebulæ obtained by the late Director Keeler.

Referring to the Lick Observatory, Prof. Simon Nemcomb says: "But its most epoch-making work is due in recent years to Campbell, by measurements of the motion of stars in the line of sight with the spectroscope. Armed with the best spectrograph that human art could make, he has, by the introduction of every refinement in his method, brought into these measures a degree of precision never before reached."

March 18. Biological Section meets at the State Normal School.

March 24. Botanical Section meets at 85 Temple Block.

March 25. Geological Section meets at the Southwest Miners' Association, First and Main Streets. Subject: "The Oynx Deposits of Arizona."

Southern California Academy of Sciences

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Astronomical Section

B. R. BAUMGARDT..*Chairman*
PROF. MELVILLE DOZIER........................ ....*Secretary*

Meets First Tuesday of Month at 724 South Broadway, Los Angeles

Biological Section

PROF. B. M. DAVIS ....*Chairman*

Meets Third Tuesday of Month at State Normal School

Botanical Section

A. CAMPBELL JOHNSON...*Chairman*
L. A. GREATA...*Secretary*

Meets Fourth Monday of Month at 85 Temple Block, Los Angeles

Geological Section

GEORGE PARSONS..*Chairman*
G. MAJOR TABOR...*Secretary*

Meets Fourth Tuesday of Month at Northeast Corner First and Main Streets, Los Angeles

Agricultural Experimental Section

DR. S. M. WOODBRIDGE...*Director*

Office and Laboratory, 115 North Main Street, Los Angeles

VOL. I. APRIL 1, 1902 NO. 4

BULLETIN

OF THE

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COMMITTEE ON PUBLICATION:

A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER T. B COMSTOCK, Ph. D.

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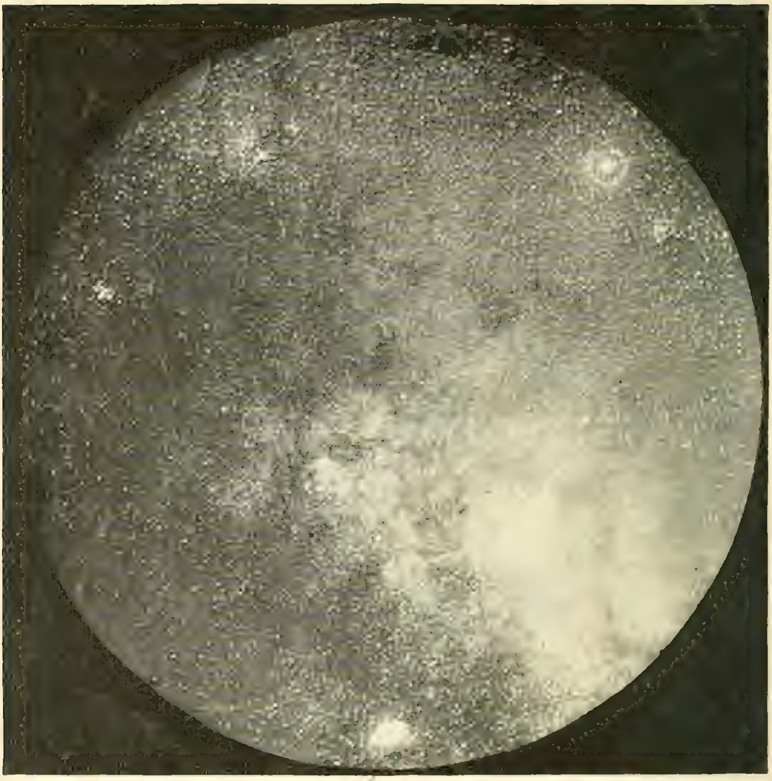

One of the richest regions in the Milky Way in the Constellation Sagitarius, from photograph by Barnard at the Lick Observatory, June 19, 1892.

BULLETIN
OF THE
Southern California Academy of Sciences

VOL. I LOS ANGELES, CAL., APRIL 1, 1902. NO. 4

Two New Erigerons

BY EDW. L. GREENE.

ERIGERON FRAGILIS. Tufted stems erect, rigid, slender, 2 or 3 feet high, very leafy up to the corymbose summit, dark-green or even purplish, scaberulous: leaves linear-filiform, 1½ to 2 inches long, ascending, rigid, very fragile when dry, rough with minute pustulate incurved hairs: corymbose panicle loose and ample, of 10 to 15 heads, the branches ascending: subulate bracts of the broad-campanulate involucre in about 3 series, nearly glabrous: rays numerous and narrow, deep-violet: achenes oblong-linear, nearly glabrous, or with obvious setiform hairs on and near the raised margins: inner pappus finely capillary, scaberulous and very fragile, the outer present but inconspicious, composed of very short and fine bristles.

TRABUCCO CANYON, Orange Co. California, June, 1901, Le Roy Abrams. (n. 1801.) Species in some sort intermediate between *E. foliosus*, Nutt. and *E. tenuissimus*, Greene.

ERIGERON STRIATUS. Stems 2 or 3 feet high, stoutish, very erect, bright-green, glabrous and notably striate, very leafy up to the corymbose summit: leaves oblong-linear, about 1½ inches long, obtuse, carinately-nerved beneath, glabrous on both faces, the margins remotely scabrous-denticulate: heads 5 to 10 on slender rigid ascending bracted peduncles:involucres campanulate their oblong-linear acute bracts in about 3 series and glabrous: rays rather few and very narrow, deep-violet: achenes oblong-linear, sparsely strigulose or almost glabrous, the margins not prominently raised or thickened; inner pappus fine and very scabrous, not fragile, the outer scanty and wholly inconspicious, consisting of few and very short bristles.

HUSTON FLAT, San Bernardino Co., Cal., August, 1900. DR. W. R. SHAW,

The specimens communicated by Le Roy Abrams. In habit and foliage this is much like the northern mountain *E. inornatus*, Greene, but the heads and flowers are of a very different character.

THE CATHOLIC UNIVERSITY OF AMERICA,
Washington, D. C.

A New Plant-Louse from Southern California.

BY T. D. A. COCKERELL.

APHIS TETRAPTERALIS, n. sp. Length of body about 1230 micromills, of wing about 2130 micromills: wings hyaline, stigma yellowish; head and thorax dark grey; abdomen sage green, with very faint lateral spots; legs very pale yellowish, tarsus and apex of tibia blackish; antennæ short, blackish. Nectaries cylindrical, short, about 60 micromills long and 30 wide; style prominent, about as long as nectaries; hind tibia about 630, hind tarsus about 100 micromills; a very small tubercule at base of antennæ in front; antennæ with the apical half of joint three conspiciously darkened, with six large sensoria, arranged more or less in three pairs; one sensorium at apex of fifth joint: length of antennal segments in micromills: (1) 36; (2) 36; (3) 198; (4) 135; (5) 138; (6a) 95; (6b) 63.

The apterous forms are bluish-green or greyish, about the color of the food plant, but a little brighter. Mounted specimens appear greenish-yellow.

HAB. LA JOLLA, California, Aug. 9, 1901, very abundant on *Atriplex canescens tetraptera* (*Obione tetraptera*, Benth. Bot. Sulph., p. 48.) The aphis does not distort the plant, but it is followed by a black fungus. There were some galls of *Asphondylia atriplicis* (Townsend)—new to California—on the same plant; and the butterfly *Lycaena exilis* (the larva of which feeds on the *Atriplex*) was flying around.

Aphis tetrapteralis differs from *A. atriplicis*, by its smaller size, mode of life and much shorter nectaries. It seems to be related to *A. monardae*, Oestlund.

Note on the Ant Which Attends Aphis Tetrapteralis.

The original specimens of *Aphis tetrapteralis* at La Jolla were attended by a small ant of the genus *Cremastogaster*. I collected a couple of these and sent them to Prof. W. M. Wheeler, who reports as follows:

"The *Cremastogaster* is either a new variety of *C. lineolata* near *coarctata*, Mayr, or an entirely new species. The sculpture is very peculiar, especially on the nodes and abdomen. In certain respects it agrees with *C. vermiculata*, Emery, a form described from very few specimens. Am extremely sorry that you

did not secure more specimens. The variation among the workers of a single nest of ants is often very great, and more specimens of this form would probably show whether it deserves to rank as an independent species. I believe it safe at present to call it *C. lineolata*, Say, subsp. *coarctata*, Mayr. n. var."

I quote the above in the hope that some member of the Southern California Academy of Sciences may be able to secure more material of this new ant. The species of *Cremastogaster* are rather easily recognized by their abdomen, which is more or less heart-shaped and shiny. Specimens should be sent to Prof. W. M. Wheeler, University of Texas, Austin, Texas.

E. Las Vegas, N. M.

Discovery of Another Food Plant of Uranotes (Theckla) Melinus, Hub.

BY PROF. J. J. RIVERS.

A flat or somewhat compressed larva was found feeding upon the parenchyma of a pod of a cultivated pole bean (known as Irwin's bean); when disturbed the larva lost its hold and fell to the ground. A slight examination told that it was of the *Lycaenidae*. Many pods were excavated after the manner of *Diabrotica*, but only to the extent of the inner lining of the legume. Others bored through and attacked the seed and devoured a considerable part of a large bean.

In Dr. Holland's book on butterflies *Uranotes melinus*, Hab. is mentioned as "one of the hop butterflies" but this citation is incomplete and a little misleading for the butterfly is common where no *Humulus* grow. Another author records it feeding upon *Humulus* and *Crataegus*. *Thecla humuli* Harris, as cited in "Prof. G. H. French's Butterflies" appears synonymous with *U. melinus*, Hub. As this species has shown in California a partiality for Leguminosae it would not be very prophetic to suggest that it might be found upon *Lupinus Chamissonis* so common on our coasts. The tone of color of the larva and the bean pod agree and the texture is similar, the larva having a short, smooth pile, while the pod is less conspicuous, being coated with a bloom having a semi-velvet appearance.

Chrysalis: held by a few silken threads. The chrysalis is of a dark brown color, head and thoracic parts having an undertone

of rusty, but after the escape of the imago therefrom it becomes a lighter brown. The abdominal region much congested and much flattened on the underside. At the anterior portion where the convexity ceased there are a few short stiff hairs; the anal portion is covered by a close-set pile. Size: length, 11mm, width, 6 mm.

Ocean Park.

Notes

From analysis and experiments conducted by the Dept. of Agriculture on the value of the many Insecticides and Fungicides sold to the public the following conclusions have been arrived at: "Slug Shot," "Bug Death" and "Black Death," are of little or no value. "P. D. Q.," "Instant Louse Killer" and Lambert's "Death to Lice," as lice killers are frauds. "Grape Dust" and "Veltha" contain 35 per cent. of sand or other useless ingredients.

Mr. A. A. Heller, author of the "Catalogue of Plants of North America," made a flying visit to Los Angeles on his way to Santa Rosa. He expects to locate in the latter place for a year or so.

Railroad improvements in East Los Angeles are likely to exterminate our rarest sunflower, *Helianthus Oliveri*. Some members of the botanical section are distributing roots in the hope of perpetuating this plant. To any one interested in the preservation of the species, we will forward roots, on the receipt of the small sum necessary to pay the cost of transmission.

The New York Botanical Gardens are this season offering prizes of $50, $30 and $20, for the best essays on the preservation of our native plants. This amount spent annually in the actual preservation of our rare plants would seems to us the best solution of the question.

Some species of flesh fungi seem to require a much greater time to respond to the stimulus of moisture than others, a fact that has probably much to do with the seasons for the different species. It will be interesting to observe whether the unusually late but abundant rains, will produce a plentiful crop in the usual succession, but a month or more later than ordinary.

Book Reviews

A REVISION OF THE GENUS CALOCHORTUS BY CARL PURDY.

We have been anticipating with considerable interest the above revision which has now appeared as No. 4, Vol. 2, Proc. Cal. Acad. of Sciences. In this revision due credit is justly given to Watson, whose accurate descriptions in the Botany of California have been found to agree closely with those of all subsequent investigators. Mr. Purdy's method of classifying the species is more likely to appeal to the florist than to the technical botanist. The many intergradations or varieties he prefers to consider as "strains," and he has grouped the variable species accordingly.

In group VII for example (the type of which is *splendens*) *C. Catalinae* is included. Neither in shape of flower (*splendens* is obconic while *Cata-*

linae is cup shaped) nor in pod or testa is *Catalinae* at all allied to *splendens*, and the latter is we think best retained in a separate group as Watson has done. Some of the varieties the author believes hybridize freely but this will require practical demonstration. Our attempts at hybridization of the the common species have, like those of the author, always resulted in failure.

The author might with advantage have paid more attention to the characteristic shape of the pods, the recurving of the sepals in some species, and the quality of the hairs on the petals. Some of the observations on the latter do not agree with our investigation on the same species in Southern California. Here *C. venusta* has the hairs simple, *C. splendens* has them not only matted but glandular. *C. Palmeri* the author has not seen, all those sent him as such being either *C. invenustus* or *C. splendens*, var. *montanus* What we understand as *C. Palmeri Wats.* is still abundant at its original station, the Mojave River, and on the higher hills on the desert slope as far as Rock Creek. The author has added several new species, and among the illustrations are drawings of the petals of many of the species. These from a diagnostic point of view are the most important of the illustrations. The other illustrations are the least satisfactory features in a work that is otherwise a useful contribution to botanical literature.

Publications, Etc., Received

Market Milk, a plan for its improvement. U. S. Dept. Agriculture, Bureau of Animal Industries.

Dairy products at the Paris Exposition of 1900. U. S. Dept. of Agriculture, Bureau of Animal Industries.

Insecticides and Fungicides, U. S. Dept. of Agriculture. Farmers' Bulletin, No 146.

Carbon bisulphide as an Insecticide. U. S. Dept. of Agriculture. Farmers' Bulletin, No. 145.

Proceedings of the California Academy of Sciences. Vols. 1, Nos. 1-10; Vol. 2, Nos. 1-6.

Journal of the New York Botanical Garden. Vol. 3, No. 25.

The Berkeley Hills, a detail of Coast Range Geology, by Andrew C. Lawson and Charles Palache. Bulletin of the Department of Geology, University of California. Vol. 2, No. 12.

Fourteenth Annual Report of the Agricultural Experiment Station of the University of Tennessee for 1901.

New Bees of the Genus Andrena, from Wisconsin, by T. D. A. Cockerell. A reprint from Canadian Entomologist, Feb., 1902.

The value of corn, skim milk and whey for fattening swine. Bulletin of Agricultural Experiment Station of the University of Tennessee. Vol. 15, No. 1.

Transactions.

ACADEMY OF SCIENCES.

March 11, 1902.

The regular monthly meeting was held this evening at 724 South Broadway.

Nine applications for membership were received and referred to the Board of Directors.

The report of the committee on "Modernized English" as read by Mr. G. Major Taber was adopted.

The following resolution was introduced by Mr. G. Major Taber:

RESOLVED: That the subject of a paper read before the Academy by Mr. A. L. Bancroft, entitled "Modernized English from a Standpoint of Usefulness," be referred to a committee of five to consider the advisability of issuing a circular letter to be mailed to the scientific bodies and educational institutions throughout the United States and other English speaking countries requesting them to unite with this Academy in the inauguration of a general movement in favor of a phonetic system.

The resolution was unanimously adopted.

The President then introduced Prof. W. W. Campbell, Director of the Lick Observatory, who delivered a lecture on "The Translation of the Sun Through Space."

The lecture was illustrated with numerous lantern slides from spectrographic views taken with the Crossley reflector at the Lick Observatory. Some interesting views of Novo Perseus, the Nebula in Orion, the Pleiades were also shown on the screen.

Prof. Campbell gave a comprehensive review of the Astro-Physical work carried on at the Lick Observatory, explaining all the instruments used and the methods adopted for the pursuit of desired ends. An outline was given of the results so far obtained in the line of sight observations of the stars and a statement made of the purposes for which the branch of the Lick Observatory was at present being established in South America. The net result of the lecture may be expressed in the following statements:

1. The sun is moving through space with a velocity of 12½ miles per second.

2. The direction of the solar motion points to the neighborhood of Alpha Lyra.

3. The distance of the average star is about 3000 light years.

4. The type of our solar system is comparatively rare in the universe.

5. The latest investigations would seem to prove the universe to be limited.

The lecture was highly appreciated by the large audience present.

A discussion followed at the close, after which the meeting stood adjourned. B. R. BAUMGARDT, Secretary.

ASTRONOMICAL SECTION.

March 4th, 1902.

The Astronomical Section met at the usual hour this evening, and was called to order by Chairman Baumgardt. The minutes of the last meeting were read and approved.

Mr. Knight spoke of the successful lecture tour of the chairman at San Francisco, under the auspices of the Santa Fe Railway Co., in the interests of a reading room, established by the Company, for the use and benefits of its employes.

Mr. Knight also called attention to the lecture to be delivered before the Academy on March 11th, by Prof. Campbell, Director of the Lick Observatory, and read some highly commendatory statements relative to Prof. Campbell, from the pen of Prof. Newcomb.

The chairman also emphasized the importantance of the approaching meeting of the Academy in view of the high standing of Prof. Campbell among the astronomers of the world.

The discussion of the evening was then introduced by Mr. Melville Dozier, being an exposition of the effects of longitude and latitude upon the measurement and division of time and the fixing of dates. The question of the so-called "International Date Line" was elucidated, and by the aid of diagrams, its true nature and practical value made clear. Other points of interest, growing out of the revolution of the earth on its axis, were incidentally involved in the discussion, in which many took part.

After the reading by Mr. Knight of a humorous paraphrase of the astronomical terms the meeting adjourned. MELVILLE DOZIER, Sec'y.

BOTANICAL SECTION.

The regular monthly meeting was duly held on the evening of Monday, March 24th. Mr. Austin Campbell-Johnston, Chairman of the Section presided, and there were also present Messrs. Braunton, Russell, Davidson and Greata.

There being no especial business before the meeting, the evening was devoted to the examination and discussion of various plants. Among the most interesting of the specimens examined were *Rosa Mohavensis*, Parish, collected by Mr. Parish at a place called Cushenberry Springs, on the edge of the Mohave Desert, and *Sphaerostigma erythra*, collected by Dr. Davidson near Clifton, Arizona. This species will be described in a subsequent issue of the Bulletin of the Academy.

Mr. Greata submitted a collection made by him in the neighborhood of Lake Tahoe in June last. The beautiful red Gilia, *G. aggregata*, was perhaps the most striking plant in the collection, although by no means the most interesting. Many old friends of the San Gabriel and San Bernardino Mountains were found to occur in the Tallac region, and it was not uninteresting to find the Desert Sage growing in close proximity to Mountain Flora.

A very handsome Panicum, from the neighborhood of Mount Shasta, was deposited by Mr. Greata with the Division of Agrostology at Washington, and has been published by the Division as *Panicum shastense*. It is near *P. dichotomum*. LOUIS A. GREATA, Secretary.

GEOLOGICAL SECTION. No meeting held.

BIOLOGICAL SECTION.

The meeting for March was postponed on account of the inclemency of the weather.

Calendar for April

APRIL 1. Astronomical Lecture at 724 South Broadway. Lecture by Prof. J. F. Chamberlain. ☙ Subject: "Glaciers."

APRIL 8. Academy of Sciences. Regular Monthly Meeting. Two papers will be read, (1) "Rhus diversiloba" (Poison Oak) illustrated with drawings, by Dr. C. Schwalbe; (2) "The Germination of Seeds," by Dr. C. A. Whiting.

APRIL 15. Biological Section meets at southeast corner Tenth and Flower Streets. Exhibition and examination of histological and anatomical material.

APRIL 21. Meeting of Botanical Section.

APRIL 22. Meeting of Geological Section.

Southern California Academy of Sciences

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Meets Third Tuesday of Month at State Normal School

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A. CAMPBELL JOHNSON..*Chairman*
L. A. GREATA...*Secretary*

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Geological Section

GEORGE PARSONS...*Chairman*
G. MAJOR TABER...*Secretary*

Meets Fourth Tuesday of Month at Northeast Corner First and Main Streets, Los Angeles

Agricultural Experimental Section

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Office and Laboratory, 115 North Main Street, Los Angeles

VOL. I. MAY 1, 1902 NO. 5

BULLETIN

OF THE

Southern California Academy of Sciences

A Monograph on Pecten Aequisulcatus, Cpr.

—BY—

MRS. M. BURTON WILLIAMSON.

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MAILED MAY 10, 1902

Calendar for May.

MAY 13. Annual Meeting of the Academy of Sciences. Reports of the Secretary and Treasurer. Election of Board of Directors for the ensuing year. Discussion of Prof. Newcomb's article, "The Problem of the Universe," which appeared in the April number of the International Magazine.

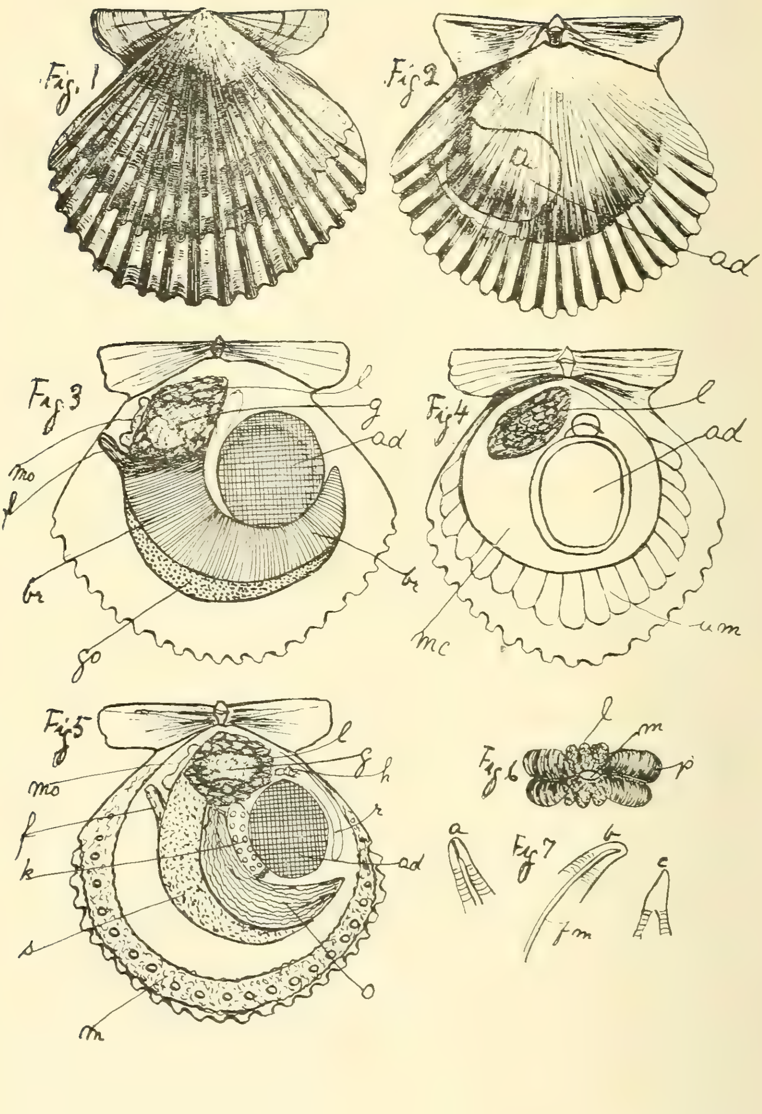
MAY 20. Biological Section. Dr. Houghton, of Chicago, will report on the work done by Dr. J. Loeb. Short reports will be made on "Variation in Weight of Eggs during Incubation" and the "Growth of Mould."

MAY 26. Botanical Section will meet at room 85, Temple Block.

MAY 27. Geological Section will meet at Southwest Miner's Association, First and Main Streets.

MAY 27. Geological Section—Lecture by Prof. G. E. Bailey, of the State Mining Bureau. Subject: "The Geological History of Death Valley," with maps and illustrations.

PLATE IV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BULLETIN

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VOL. I LOS ANGELES, CAL., MAY 1, 1902. NO. 5

A Monograph on Pecten Aequisulcatus, Cpr. Class Pelecypoda.

BY MRS. M. BURTON WILLIAMSON

ORDER PRIONODERMACEA. SUBORDER ISODONTA. FAMILY PECTENIDÆ.

Pecten (*Plagioctenium*) *aqeuisulcatus Cpr. Monterey*, *California*, *to Todos Santos Bay*, *Lower California*.

Shell circular in shape excepting at the hinge margin which is straight, occasionally the posterior part of the shell is somewhat oblique. The ears or auricles of the shell are situated at either end of the hinge margin. The hinge line is narrow and there is an internal cartilage pit which is not broad but rather deep. The beaks are prominent and are close together. There are usually twenty strong ribs on each valve, although occasionally nineteen, and, less often, twenty-two are found*. There are usually the same number of ribs on each valve, but sometimes there is one more on one of the valves. The lines of growth between the ribs are very noticable. The anterior, right auricle is narrower than the ear on the left valve as the byssal opening or notch is found at this point. Directly under this notch in the shell are 4 or 5 points or teeth. Occasionally less and sometimes more than this number are plainly discernable under a magnifying glass. The auricles on the posterior side of both right and left valves are equal. The valves are rather convex in shape, the lower, or right one being more ventricose especially near the umbones or beaks. The valves are pointed on the ventral margin and the shell closes excepting at the byssal notch and the ends of the two auricles which are always widely apart, comparatively. The color of the shell is white or a yellowish tint, al-

*The size of the specimen does not regulate the number of ribs. I once found 23 ribs on one valve and 22 on the other of a shell less than 2¼ inches across, while specimens as large as 3¾ inches averaged 20 or 21 ribs and no valve had over 23 ribs.

most a saffron color in some pectens. The valves are marked with zigzag stripes or mottled with a variety of shades of color. Dark red with pink and reddish brown and yellow and yellowish brown in varying shades are the prevailing colors. White shells generally show reddish brown clouds and color markings and shells with yellowing tints are marbled with yellowish brown. The under or right valve is uniformly of a lighter color—sometimes almost white. Occasionally a white valve with yellow color markings will be joined to a valve with reddish brown color marks, in fact, variety in color effects is one of the great charm of the species. The color variation is so noticable that the writer, in making a limited statistical study of the ribs in a given number of specimens, also listed color variations in order to make a comparative study. A partial study was made of four lots of shells collected respectively in the years 1893, 1894, 1897 and 1901. The first named were collected by a fisherman in Alamitos Bay (this is the extreme southern portion of the larger bay San Pedro, but is locally called Alamitos Bay). The collection of 1894 was made by the writer. These pectens were collected on a mud-flat on East San Pedro, on the channel side of the bay. The pectens—extra large—of the 1897 lot were dredged in sand by a fisherman in San Pedro Bay, as was also the lot of 1901, which was dredged by Mr. H. B. Torrey for use in his class in the marine biological laboratory at East San Pedro. Colors on the upper valve show more tendency to uniformity than tints on the lower ones, being much darker as a rule. Colors on lower valve, pure white, white mottled or marbled with reddish brown, saffron yellow, saffron mottled with brown; occasionally a dirty grey with a few dashes of white but this color is more generally represented on the upper valve.

Pecten (*Plagiocteninm*) *aequisulcatus Cpr.* are sand dwellers. In San Pedro Bay they are dredged in water from 4 to 14 feet, but at very low tide, when a long stretch of wet sand lies uncovered by the water, before the morning sun breaks his way through the misty fog, a colony of scallop shells may be found in a sandy mud flat. In this mud flat there are numerous little depressions and in these, covered with water, *Pecten aequisulcatus* are seen opening and shutting their valves so rapidly one hears the sound in every direction, and, at the same time the scallop throws out a stream of water while occasionally one of the scal-

PLATE V

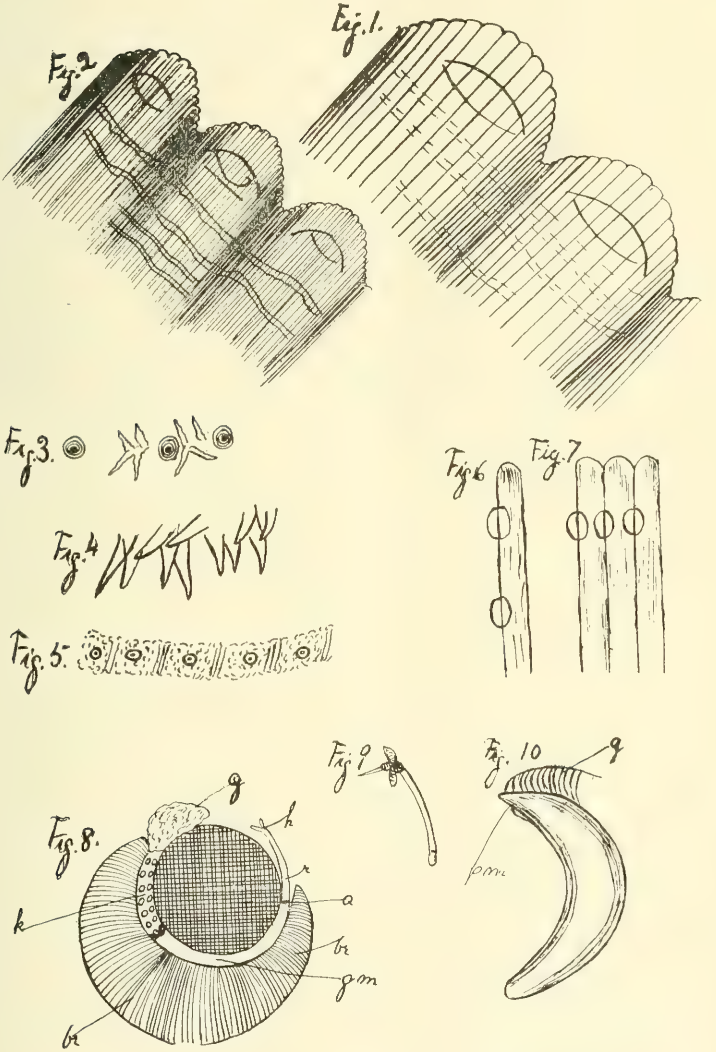
Fig. 1.
Fig. 2
Fig. 3.
Fig. 4
Fig. 5.
Fig. 6
Fig. 7
Fig. 8.
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k
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gm
br
Fig. 9
Fig. 10
q
pm

lops makes a spring in the water. When the shell is opened by the little animal the body appears to be of a bright orange yellow color. In each open valve of this headless mollusk one can see the mantle border fringed in gay colors and also a row of bright, black ocelli (eyes) that with the gay color of the body* of the shell fish forms a picture never to be forgotten. When uncovered with water pectens outline their shell in the sand where mounds of it reveal their rounded form.

ANIMAL.

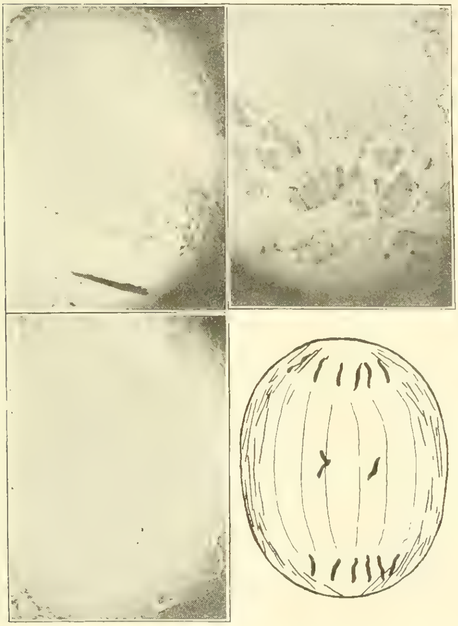
Mantle: Filmy, white, showing very plainly the scalloped impression of the ribs of the shell. Above this scalloped impression the mantle is very thin and transparent. (Fig. 4, plate 11)

The mantle is open entirely on the byssal side and ventral edge but is closed near the adductor muscle, just below the posterior auricle or ear of the shell. The mantle is open at the margin of both auricles. Is closed along the dorsal edge of the shell, that is, below the hinge line. (Why is the mantle open under each auricle of the shell? Is it for the entrance and exit of water? I have not satisfactorily found an answer to this question.)

The mantle has a double border, one that has been referred to as white, bearing the impress of the ribs of the shell, and, the other close to the ventral margin of the pecten, which shows the ocelli and rows of points or tentacles lying closely together. (Figs. 3 and 5, plate V). These form a heavy fringed border. This border is yellowish alternating with black caused by the tentacles of the mantle border being a yellowish or dirty white color with black lines covering the base of these fringes. Short nodules, also with fine stripes of black fill in the interstices between the numerous ocelli. These ocelli are situated on nodules or short tentacles that are somewhat rounded, not sharp pointed like the tentacles without the ocelli or eyes. The ocelli are bright green with red centers which I may, for convenience, call the pupil. (Fig. 3, page V.) Besides the green color of the iris (?) there is present a purple color giving the eyes an irridescent effect. This is in some lights, in others the ocelli have a bluish tint and each center or pupil is opaque or a dull white color. These eyes do not extend the length of the mantle border. Besides the well developed ocelli there are always present a number, sometimes

*While the yellow part visible appears to be the body or visceral mass, it is in fact one or more organs of that body.

VI



A part of a gonad from a mature Pecten showing the sperm gland.

The gonad from a young Pecten showing both the ova and sperm glands.

A part of a gonad from a mature Pecten showing the ova gland.

A dividing cell from the gonad of ihe Pecten, found on the liver.

more than others, of immature eyes; these are found on the mantle border on either side of the mature ocelli. The number of fully grown ocelli in each specimen varies from about 46 to 50; 23 to 25 in each valve. These eyes are not situated at equal distances, nor do they lie one in each scallop. In a specimen numbering 21 ribs on one valve there were 23 large ocelli besides the undeveloped ones.

Branchiae or Gills: The branchiæ or ctenidium are double and there are two, one on either side of the body. They are semi-circular in shape (Fig. 1, 2 and 8, plate V). They extend on either side of the body from under the liver—which is situated on the anterior portion of the shell just below the dorsal margin—across to the adductor muscle around to the point where the rectum lies close to the adductor muscle. At this point both the double gills meet, but are not attached to each other. The gills are attached on the inner circle to a white, translucent, crescent shaped membrane (Plate V, figs. 1 and 3). This membranous body is in turn attached to the adductor muscle excepting at the extreme posterior end where for ¼ inch this transluscent body is free. This is just above the end of the rectum. The gill membrane is not so filmy as the mantle and is very much thicker. The branchiæ or gills are composed of transparent tubes or filaments (Figs. 1 2, 6 and 7 plate V). These are easily broken asunder, when the gills appear only like single tubes attached at the top. The connective tubes or tentacular junctions when present are plainly discernable under the microscope. The edge of the gills are formed of deep scallops—not seen by the naked eye—under the microscope each scallop is found to be composed of about 17 scallops.

The color of the branchiæ is a yellowish brown, but under the dissecting glass each tube is of a bright yellow color before the animal has been placed in alcohol.

Foot: Tongue shaped and small. (Figs. 3, 5 and 7, plate IV, has a groove on the under side (a. b, fig. 8, plate IV) next to the byssal notch in the shell. In adult specimens there is no byssus present. I once found an exception to this rule when the animal had three or four strong byssal threads growing out of the foot.

Adductor muscle is large and is situated below the dorsal mar-

gin of the shell beginning near the middle of the shell on the posterior portion. (Fig. 2, 3, 4 and 5, plate IV.)

Byssus: As remarked, adult shells are not furnished with a byssus, the exception noted being extremely rare. The young swim or dart through the water and are capable of forming a byssus whenever they find themselves near to any object to which they desire to become attached. When first formed the byssus appears only like threads of mucous.

Siphon: None.

Mouth: Is situated above the foot, near the byssal opening in the shell. The mouth is furnished with palpi (fig. 6, plate IV) that are coarsely ridged and somewhat fan-shaped; these palpi are joined to lips that are convolute or circinate in form. The lips appear only as an extension of the palpi toward each other. Besides being circinate they are coarsely striate and the outer edges are scalloped.

Kidney or Nephridium: The kidney lies on the anterior portion of the adductor muscle, beginning under the liver region and extending somewhat along the region of the gonad. The shape of the kidney is elongate or tube like. (Fig. 5, plate IV, fig. 8, plate V). There are two kidneys or nephridia.

Gonad or reproductive organs: The gonad lying under the gills are highly colored, the ovum of a bright orange, the sperm of a deep *cafe au lait* color. These two glands are not separated but form what appears to be an attachment and extension of the foot —the sperm gland being the same color and apparently connected with the foot. The reproductive organs do not commence at the foot however, but occupy considerable space above and between the foot and adductor muscle. The ova encircles the kidney or nephridium and extends partly around the adductor muscle. (Fig. 8, plate V). It is the presence of the highly colored gonad which gives the animal its orange color. The spermatazoa gland partly encircles the ova gland. The relative size and position of the hermaphrodite gland varies in specimens; in one shell the ova may begin a little nearer the foot and the sperm gland or testes, may occupy a smaller space; this is obvious. Besides this hermaphroditic gonad, on the liver, there is a network of greenish-white bodies—the greenish appearance probably due to the dark liver which shows somewhat through the semi-transparent substance, or at least, between

the interstices of this granular layer. These greenish(?) white bodies or spermatazoa are grouped into irregular masses of lace-like layers on either side of the liver.* (fig. 5, plate iv.).

The statistical tables are given merely to approximate variation of the San Pedro scallops, not as conclusive proof of the variation of species in form and color in that bay.

The color given is the basic color with mottled variations. In order to find the true color the shells were cleaned with acid and water. When not cleaned the shells are usually of a saffron yellow or a dirty grey or white color, especially is the saffron yellow discernable on the lower valve. As will be seen in the table, the Alamitos examples have specimens that are of a saffron or orange yellow even when cleaned with acid, that is, when the periostracum or outer coating was removed the shells were still shown to be of a saffron color. This was not the case with many other specimens. The interior of the majority of shells was of a rich, reddish brown color up to and around the muscle scar.

Los Angeles, California, Sept. 30, 1901.

PLATE IV.

Fig. 1. *Pecten* (*Plagioctenium*) *aequisulcatus*, *Cpr.* Right valve—lower one.

Fig. 2. Upper or left valve of the same, showing interior. Ad. adductor muscle impression. (Size of shell, 2 in. high, 2¼ long.)

Fig. 3. Showing organs *in situ* after the upper mantle has been removed to show the gills: mo, mouth; l, liver; g, generative organ on the liver; f, foot; ad, ad. mus.; br, branchia or gill; go, gonad or reproductive organs.

Fig. 4. Upper side of the mantle; under edge containing ocelli, not visible: l, liver; m. c., mantel cavity; ad, ad. mus.; u. m., upper edge of mantle.

Fig. 5. Upper mantle removed; gill removed to show the reproductive organs: l, liver; g, generative organs on the liver; h, heart: r, rectum and anus. a, ad. mus.; mo, mouth; f, foot; k, kidney or nephridium; s, sperm; o, ova; m, mantel border with ocelli.

Fig. 6. Mouth, lips and palpi.

Fig. 6. Three views of the foot, upper and lower side and one showing the foot muscle.

*In order to confirm the opinion of the writer as to the character of the granular layers found on the liver, cross sections were prepared and mounted under the direction of Prof. C. A. Whiting, of Los Angeles, to whom thanks are due.

PLATE V.

Figs. 1 and 2. Branchia or gill. Section* of gill magnified, showing filaments or tentacular junctions.

Figs. 6 and 7. Views of filaments and tentacular junctions, more highly magnified than figures 1 and 2.

Figs. 3, 4 and 5. Ocelli and tentacles of the mantle-border. Figs. 3 and 5 show the relation of eyes or ocelli to the tentacles, the first named, figure 3, slightly enlarged. Fig. 4 has tentacles alone, also enlarged.

Fig. 8. Showing the gill membrane around part of the adductor muscle: g, generative organ; k, kidney; g. m., gill membrane; br, branchia or gill; a, anal aperture; r, rectum; h, heart.

Fig. 9. Another view of the heart, auricles and ventricles, with the intestine passing through.

Fig. 10. A second view of the gill-membrane, somewhat enlarged, detached from the adductor muscle and spread out, also part of the gill: p. m., point of the membrane that *at all times is free from the adductor muscle.*

*Excepting the gill sections, the drawings, for the most part, were made natural size. As they were made from several specimens, some alcoholic, they represent an idealized. Pecten.

Thanks are due Miss Alice Cooper for her accurate reproduction of the author's sketches The shell, figs. 1 and 2, plate IV, was drawn from the original by Miss Cooper.

The author is indepted to Prof. C. A. Whiting, for photographic reproductions of cross sections, and also for a drawing of the same.

PECTEN ÆQUISULCATUS—Col. Alamitos,* 1893
Color of Lower Valve—Upper not given.

Upper Valve	Lower Valve	Pure White—no other color	White Mottled with Reddish Brown	Mottled Yellowish with Brown	Saffron Mottled with Brown	Saffron	Height	Length	Points on Lower Valve	NOTES FOR TABLES LOWER VALVE MEASUREMENTS
Ribs	Ribs						mm.	mm.		
20	20	....	x	....	....	....	60	62	x	Height measured from
19	20	....	....	x	....	....	51	53	....	
20	21	....	x	....	....	....	59	60	x	umbo to the ventral mar-
20	20	x	....	....	....	....	47	47	x	
19	20	....	x	....	....	....	57	57	....	gin in mm.
20	19	....	....	x	....	....	55	55	x	
23	22	....	x	....	....	....	55	56	....	Length measured from
19	19	....	....	x	....	....	48	49	....	
21	20	....	....	x	....	....	53	53	x	anterior to posterior edge
21	22	x	....	....	....	....	43	43	x	
21	21	....	....	....	x	x	53	53	....	in mm.
19	20	....	....	....	x	x	40	40	....	

Col. in San Pedro Bay in July, 1894.

Upper Valve	Lower Valve	Pure White—no other color	White Mottled with Reddish Brown	Mottled Yellowish with Brown	Saffron Mottled with Brown	Saffron	Height	Length	Points on Lower Valve
20	23	....	....	....	....	x	70	72	x
19	20	....	....	....	....	x	80	82	x
19	20	....	....	....	....	x	72	74	x
21	20	....	x	....	....	....	73	72	x
19	20	....	....	....	....	x	76	76	x
21	21	....	....	....	....	x	70	72	x
19	19	....	....	....	....	x	71	70	x
19	19	....	....	x	....	....	75	76	x
20	21	....	....	....	....	x	75	75	x
22	21	....	....	....	....	x	75	77	x
21	21	....	....	....	....	x	79	77	x
21	20	....	....	....	....	x	75	79	x

*Alamitos Bay is the extreme south of San Pedro Bay and part of the bay.

These shells were much smaller than others.

Pectens in the 1894 collection that had one or more crepidula on the lower valve were white mottled with reddish brown where the crepidula were attached; the rest of the valve was of a saffron yellow mottled or marbled with brown.

Upper valve measurements not given in these tables.

PECTEN ÆQUISULATUS—Col. in San Pedro in March, 1897 (Dredged.

Upper Valve	Lower Valve	White—pure	White Mottled with Reddish Brown	Yellow—Pale Mottled with Brown	Saffron	Saffron Mottl'd with Brown	White—Pink Lines	White Mottled with Yellow			Points	Lower Valve Measurements.
Ribs	Ribs								mm.	mm.		
21	21	......	x	....	......	......	......	......	99	90	x	
21	21	......	x	....	......	......	......	......	100	91	x	
23	22	......	x	....	......	......	......	......	113	104	x	
22	21	......	x	....	......	......	......	....	105	95	x	
21	22	......	x	....	......	......	......	......	103	102	x	
20	21	......	x	....	......	......	x	......	110	1 7	x	
20	29	......	....	....	......	......	......	x	101	95	x	
20	20	......	x	....	......	......	......	x	102	95	......	
22	22	......	x	....	......	......	......	x	118	113	x	
21	20	......	x	....	......	......	......	......	105	101	x	
19	19	......	x	....	......	......	......	......	100	100	x	
21	21	......	x	....	......	......	......	......	113	105	x	

San Pedro Bay, August, 1901—Dredged by Mr. H. B. Torrey for use in the Marine Laboratory.

21	21	......	x	....	......	......	......	......	93	90	x	
21	22	......	x	....	......	......	......	......	75	74	x	
20	21	......	x	....	......	......	......	......	77	70	x	
21	21	......	x	....	......	......	......	......	82	77	x	
21	22	......	x	....	......	......	......	......	80	75	x	
23	23	......	....	....	......	......	......	......	76	82	x	
21	21	......	....	....		......	......	......	74	77	x	
21	21	......	x	....	......	......	......	......	93	91	x	
23	24	......	x	....	......	......	......	......	75	72	x	
22	23	......	x	....	......	......	......	......	72	70	x	
20	19	......	x	....	......	......	......	....	70	70	x	
22	22	......	x	....	......	......	......	......	72	70	x	

Transactions.

ACADEMY OF SCIENCE.

LOS ANGELES, April 8, 1902.

The regular monthly meeting was held this evening at 724 South Broadway.

President Knight occupied the chair.

Eleven new memberships were voted upon favorably by the Academy, as follows: Dr. Fitch C. E. Mattison, C. B. Boothe, W. A. Boyd, M. D., Dr. Wm. Capps, H. B. Perkins, S. P. Channell, O. H. Goodwin, James A. Chamberlain, Adolf Kraemer, H. P. Barnes, Rabbi S. Hecht, D. D.

The first paper of the evening was by Dr. C. Schwalbe on

POISON OAK AND THE CAUSE OF THE POISON.

(This paper will be published in extenso in a subsequent issue of the Bulletin.)

Professor C. A. Whiting followed with a lecture on

THE GERMINATION OF THE SEED.

After a short description of the parts of the flower necessary to pollination, the process of germination was explained, as was also the value of cross-fertilization n the quality of the seed produced. The seed of dicotyledons and monocotyledons were described. Stories of seeds germinating after centuries of rest are almost certainly without foundation in fact, he said The method of absorption and cell growth, the upward growth of the stem and the downward tendency of the root, were explained and illustrated by the growing bean, pumkin and melon. The influence of bacteria in elaborating nitrogen in the roots of Legumes, and its consequent value was noted. The lecture was illustrated throughout by color drawings by J. E Stuart.

Adjourned. B. R. BAUMGARDT, Secretary.

ASTRONOMICAL SECTION.

April 1st 1902.

The Astronomical Section was called to order by the chairman, B. R. Baumgardt, who made preliminary remarks touching astronomical topics of interest. The paper of the evening was a discussion of the subject of Glaciers, presented by Prof. J. F. Chamberlain of the State Normal School, who considered the subject from standpoints of history, science and observation, communicating many facts of interest and holding the closest attention of his hearers. The discussion was continued with much interest by those present, to the profit of all.

MELVILLE DOZIER, Sect'y.

BOTANICAL SECTION.

The monthly meeting on April 28th was well attended. The evening was occupied with the examination of specimens and the discussion of arrangements for the field meetings.

GEOLOGICAL SECTION.

The Geological Section met at the rooms of the Southwestern Miners Association, on Tuesday evening the 22d inst.

Chairman George W. Parsons called the meeting to order.

The attendance was large, and a very interesting description was given by the Chairman of "Desert Mining," and his observations by the wayside, on a 1000 mile trip in connection with Prof. W. L. Watts, over the eastern part of San Bernardino County and the southwestern part of Nevada.

The Chairman's description of the Desert Flora, the necessity of developing water, and his suggestions in regard to the duties of the Supervisors in caring for the wells along the route over the desert, were on practical lines.

The Chairman separated the usual mining schemes into two classes—good and bad—and cited an instance where Prof. Watts had examined a mine which was afterwards sold for seven times his estimate of its value.

The speaker emphasized the importance of having good roads constructed by the Supervisors through the mining districts, and the necessity of developing water supplies for the convenience of the miner and prospector, as well as for the agricultural possibilities.

At the conclusion of the Chairman's remarks, Prof. Watts gave a scientific description of the geological formation of the section through which they had traveled.

Col. G. E. Bailey, who is temporarily connected with the State Mining Bureau, gave a very interesting talk on the borate and nitrate fields of California and elsewhere.

Remarks were made by President W. H. Knight and others.

G. MAJOR TABER, Secretary.

BIOLOGICAL SECTION.

The regular April meeting was held at the laboratory of Dr. C. A. Whiting instead of the usual meeting place, the State Normal School.

A short account of the modern technique of Neurological investigation was given by B. M. Davis. The subject was outlined from an historical standpoint in which the contribution of each method was shown. Dr. Whiting called attention to some interesting points in regard to proteid transfer in animal bodies.

The latter part of the meeting was made informal in order to examine the laboratory and the specimens of work on exhibition.

Notes.

The summer session of the Biological laboratory of the University of California will be held at San Pedro beginniug about the 15th of June and continuing six weeks. Only advanced students will be admitted. The laboratory will be in charge of Dr. H. B. Torry and Dr. Charles A. Kofoid.

Regular weekly field excursions are being made by the members of the Botanical Section. The following localities were visited and explored

during April: Glendale Hills, Millard's Canyon, Monrovia and the hills west of Temple street.

The first excursion in May by the Botanical Section will be to Glendora. Members wishing to unite with the Section on this occasion may learn particulars by applying to the Secretary of the Botanical Section, Mr. Louis A. Greata, Room 85 Temple Block.

With the June issue of the Bulletin we will begin the publication of the History of Prehistoric California, by Dr. L. G. Yates, of Santa Barbara. This work for which Dr. Yates has been gathering material for nearly half a century, will be copiously illustrated with wood cuts and photo-engravings of the choicest specimens of the many ancient weapons and utensils found in California. As many of the originals from which these drawings have been made are now scattered among the museums of the civilized world, no future work can possibly equal in interest or value the one we are about to publish.

The copies of the Bulletin published are limited to 500, most of which are distributed to the members of the Academy. The few remaining numbers are open to general subscription. Those wishing to subscribe, please do so at once. Terms, $1.00 per annum. In future no single numbers of the Bulletin will be sold.

VOL. I. JUNE 1, 1902 NO. 6

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION:

A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER T. B COMSTOCK, Ph. D.

CONTENTS:

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231 WEST FIRST ST., LOS ANGELES, CAL.

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MAILED JUNE 13, 1902

WILLIAM H. KNIGHT,
Past President, Southern California Academy of Sciences

PROF. THEODORE B. COMSTOCK,
President Elect, Southern California Academy of Sciences

BULLETIN
OF THE
Southern California Academy of Sciences

VOL. I LOS ANGELES, CAL., JUNE 1, 1902. NO. 6
231 WEST FIRST STREET.

New or Little Known Southern California Plants.

BY LE ROY ABRAMS.

PARNASSIA CIRRATA, Piper. Erythea, 3:128, 1899. The type locality of this species is Mt. San Bernardino, where it was first collected by Parish Bros. in 1879. In August, 1900, it was again collected for the second time by Dr. W. R. Shaw on the Bear Valley and Redlands road.

RIBES MALVACEUM VIRIDIFOLIUM, R. *glutinosum,* of local lists, not *R. glutinosum,* Benth. Shrub 1-2 m. high, rather compact, the young branchlets short pubescent and more or less densely glandular with stalked glands; leaves, rather thick, 3-7 cm. broad, slightly or not at all rugose, bright green minutely scabrous and somewhat glandular with sessile glands above, pale and glandular-pubescent beneath; petioles beset with stalked glands, and more or less puberulent, dilated at base, the margins ciliate; inflorescence glandular-pubescent, racemes rather long, peduncled, drooping, many-flowered; bracts ovate 1 cm. long, ciliate toothed above; pedicels 3-4 mm. long; calyx 2 bracteolate at base, rose color below, becoming nearly white above, its tube cylindric, pubescent within, 4 mm. broad, 12 mm. long, its lobes broadly ovate, rounded at apex, 4-5 mm. long; petals rounded, 2 mm. broad, obscurely cordate at base, its claw very short; anthers nearly sessile, 2 mm. long; style 6-7 mm. long, pubescent; berries becoming reflexed at maturity on short pedicels, pubescent and rather sparsely beset with coarse gland-tipped hairs, apparently purple, 1 cm. long.

Wilson's Peak and Pasadena Trail, Los Angeles Co., No. 1525, April 15, 1901.

This differs from the type in having larger and greener foliage, more glandular inflorescence and larger floral organs, and like the type, it can easily be distinguished from *R. blutinosum,* Benth, by its pubescent style and reflexed fruit. *R. glutinosum* has a glabrous style and the berries are on rather long, slender spreading pedicels.

HEUCHERA ELEGANS. Scape 25-35 cm. high, from stout creeping root-stocks, villous-hirsute; leaves thickish, round-

cordate, 1-2 cm. broad, crenately lobed and toothed, the margins ciliate, otherwise glabrous; petioles 2-2.5 cm. long villous, stipules scarious, the free portion narrowly lanceolate, 2-3 mm. long, ciliate with long, slender hairs; panicles 14-18 cm. long, villous pubescent throughout and somewhat glandular, its branches cymose, 3 cm. long, usually 9 flowered, the uppermost becoming reduced; bracts subtending the branches about 4 mm. long lacerate, those subtending the pedicles similar but somewhat smaller; calyx pink, villous, 8-10 mm. long, narrowly campanulate, its lobes narrowly oblong, about 3 mm. long, 1-1.5 mm. broad obtuse; petals white, blanceolate-spathulate, 5-6 mm. long, about 1.5 mm. broad, obtuse at apex, narrowed below to slender claw; stamens included 3 mm. long, their anthers rounded, about 0.5 mm. long; styles equalling the calyx-lobes; seeds about 0.7 mm. long, slightly curved.

Martin's Camp, Los Angeles Co., No. 1903, July 10, 1901.

EUPHORBIA MELANADENIA, Torr, Pacif. R. Rep. 4:135.1857.

E. cinerascens, v. appendiculata, Engelm. Bot. Mex. Bound. 186. 1859.

E. polycarpa vestita, Wats. Bot. Cal. 2:73.1880.

This is perfectly distinct from *E. polycarpa,* Benth., and easily distinguished by pubescence and habits. The type locality is "low or wet places near San Gabriel, California, March 22, (1854)" collected by Dr. Bigelow.

RAMONA PACHYSTACHYA (Gray).

Audibertia incana pachystachya, Gray, Syn. Fl. 2.461.1888.

Audibertia pachystachya, Parish, Erythea 6:91.1898. Type locality Bear Valley, San Bernardino Mts.

CASTILLEJA CALIFORNICA. Stems slender, fragile, branching from a rather thick, woody root, erect and more or less branching above, 4-5 dm. high, sparsely and minutely puberulent; upper stem leaves linear, remotely and obscurely denticulate or entire, 2-4 cm. long, 2-3 mm. broad, obtuse or rounded at apex with shorter slender leafy branchlets in their axils; racemes at first viscid-pubescent or villous, becoming nearly glabrous, 10-20 cm. long; bracts red or red-tipped, about 2 cm. long, 3-4 mm. wide, entire or rarely with 1 or 2 very short lateral teeth; calyx about 2.5 cm. long, cleft about equally before and behind its lobes 1 cm. long, cleft at the apex, the teeth lanceolate, 3-4 mm. long, acute; corolla 2.-5-3 cm. long; galea about three-fourths the length of the tube, green on the back, the face bright red; the tube greenish-yellow.

This species is related to *C. Douglasii,* Benth., but differs from that in foliage habit and flowers.

Big Tejunga wash, Los Angeles Co. The slender stems straggling among low shrubs. No. 1368, April 6, 1901.

CASTILLEJA MARTINI. Stems several from a rather stout woody root-stock, erect or spreading, about 3 dm. long, villous and viscid throughout; lower leaves linear or broadly linear, entire, 2.5-3 cm. long, 3-5 mm. wide; the uppermost somewhat broader, divided to near the middle into 3-lobes, the two lateral lobes narrow, spreading, shorter than the middle one; bracts similarly lobed, slightly dilated, scarlet tipped; racemes narrow and becoming rather loose, 1-2 dm. long; calyx 1.5 cm. long, cleft nearly to the middle behind, scarcely as deep before, its segments broadly lanceolate, toothed; the teeth less than 2 mm. long, the anterior one much the shorter; galea reddish along the inner margins, 1 cm. long, equalling or slightly exceeding the tube; capsule acute 1 cm. long.

This species is closely related to *C. Breweri Fernald.,* and may prove to be only a form of that little-known species. It is what has been locally known as as *C. miniata,* Dougl, but it can be no near relative of that species.

Wilson's Peak, Los Angeles Co. No. 1881. July 10, 1901.

Pandora (Kennerlia) Grandis, Dall.

BY PROF. J. J. RIVERS.

The above named shell is one of the latest discoveries in the fossil state, of a shell species that, according to the chronologist Dall, exists now in the living state in the cold waters of Alaska.

The Neocene stratifications have numerous investigators, but the ever-changing percentages caused by additional discoveries leave the geologic truth not quite established.

Actaeon traskii, Stearns.

This large and robust species recently discovered and named by Dr. R. E. C. Stearns is found in numbers in the quaternary of Santa Monica.

Hymenoptera of Southern California—I.

BY T. D. A. COCKERELL.

Pogonomyrmex californicus, Buckl. San Pedro, 1901. (Cockerell). Determined by Prof W. M. Wheeler.

Stenamma (Messor) andrei, Mayr. La Jolla, San Diego Co., 1901. (Cockerell). Determined by Prof. W. M. Wheeler.

Agapostemon texanus, Cresson. San Pedro, July. (Cockerell).

Agapostemon californicus, Crawford. San Pedro, July 8. (Cockerell); La Jolla, August. (Cockerell).

Zacosmia maculata (Cresson). San Pedro, July 10. (Cockerell).

Bombus californicus, Smith. Variety with face of female covered with yellow hair. San Pedro, July 8. (Cockerell).

Megachile davidsoni, n.sp. Female, length 16 mm., black. Allied to *M. chilopsidis,* Ckll., but differing as follows: Larger; mandibles broad and massive at base, having beneath a large concavity, bounded on the distal side by a projecting tooth-like rim; inner edge of mandibles without an orange fringe; the inner side broad and concave, and the upper margin of the mandibles near base produced into a large thick ascending tooth; clypeus shining, with sparse strong punctures, produced into a couple of large, thick triangular processes, standing at right angles to the face, and separated by a wide interval; thorax less hairy, no white hair-band between mesothorax and scutellum. This agrees with *chilopsidis* in the massive occipital region, the wide opening between the mandibles, the close punctures of head and thorax, the simple antennæ, the ventral scopa yellowish-white or white, black on the last segment, etc.

This is a most extraordinary insect, and it is much to be desired that its habits should be observed, so as to explain the meaning of the peculiar clypeus and manibles. The process on the face suggests at first that the insect may be a *Lithurgus,* but it is a veritable *Megachile,* as is indicated by the sculpture, tarsi, etc.

Two specimens from Southern California, collected by Dr. A. Davidson. One from near Los Angeles; the other from Switzer's Camp.

Megachile angelarum, n.sp. Female. length 11½ mm., black, abdomen parallel-sided, rather narrow, with narrow white hair-bands; ventral scopa white, black on last segment; hair of head and thorax white or whitish, very scanty above; no hair-band between mesothorax and scutellum, nor white patches on anterior part of mesothorax; antennæ short. Allied to *M. prosopidis,* Ckll., but differs as follows: Smaller; broad apical margin of mandibles with two teeth at apex, and a notch near inner angle; semicircular excavation of anterior margin of clypeus without a me-

dium process, but with a pair of rounded shining denticles; clypeus confluently punctured, without a median ridge; flagellum barely rufescent beneath; hair on thorax as described above.

One from Dr. A. Davidson, marked "So. Cal., 1893;" presumably collected near Los Angeles.

If the excavated clypeus is a generic character, then it would seem that *M. angelarum*, along with *M. prosopidis*, Ckll., and *M., izucara, Cresson,* should go in Robertson's genus *Chelostomosides.*

Hesperapis eumorpha is the proper name for *Parandrena eumorpha* (misprinted *eumarpha*), Ckll., Tr. Am. Ent. Soc., xxv, p. 187. (So Cal.).

Myrmicophillous Coleoptera or Ant-Loving Beetles.

BY PROF. J. J. RIVERS.

In Europe and America many entomologists give great attention to beetles found living in or about ants' nests in social relationship. There are several peculiar species of several genera in the family of Stephalinidæ that are taken in no other situation.

It is not a rule among insects that the "lion lies down with the lamb," yet among ants this law is a natural one with certain favorites. In the neighborhood of Santa Monica the following species occur with ants: *Eulabis laticornis,* Casey; *Eulabis pubescens,* Lec.; *Anchomma costatum,* Lec.; *Apocrypha anthicoides*, Esch.

The two species recorded in order first and second run along the well-worn paths with the ants in perfect harmony, and enter their nests; the latter two are found with ants under stones in perfect social peace.

REPORT OF THE SECRETARY FOR THE YEAR ENDING MAY 13, 1902.

Los Angeles, Cal., May 13, 1902.

To the Board of Directors and Members of the Southern California Academy of Sciences:

I have the honor of presenting herewith my eighth annual report as Secretary of the Southern California Academy of Sciences.

MEETINGS.

The total number of meetings held during the year ending May 13, 1902, has been forty-four, divided as follows:

Academy of Sciences	10
Astronomical Section	9
Biological Section	8
Botanical Section	8
Geological Section	9
Total	44

In addition to the above meetings the Botanical Section has held four field sessions, at Glendale, Millard's Canyon, Monrovia and the hills west of Temple Street.

The total number of lectures and papers presented has been thirty-five.

The summary of titles and authors is as follows:

Cosmical Induction and Potential, by Prof. Edgar L. Larkin.

Scientific Ideals (President's Annual Address), Mr. Wm H. Knight.

The Homing Pigeon, by Mr. Louis van Meter.

A Still Hunt in Nesting Time, by Mrs. Elizabeth Grinnell.

The Harm of Wanton Destruction of Birds, by Dr. Francis Seymour.

The Marine Laboratory at San Pedro, by Prof. Wm. A. Ritter.

Some Late Researches in the Land of the Cliff Dwellers, illustrated, by Dr George E. Cole.

Origin, History and List of Academies of Science, by Mr. G. Major Taber.

Modern Telephony (with experiments), by Prof. J. H. Shults.

Report on the Summer work at the Marine Biological Station at San Pedro, by Drs. C. A. Whiting and Lyman Gregory.

The Latest Results in Celestial Photography, by B. R. Baumgardt.

The South Sea Islands, by Mr. Louis van Meter.

The New Star in Perseus, by Mr. Wm. H. Knight.

The Work of Prof. Simon Henry Gage, by Miss Agnes Claypole.

Quicksilver, Its Occurrence, Production and Uses, by Mr. R. S. Baverstock.

Landscape Gardening and Floriculture, by Mr. Ernest Braunton.

The Metric System, by Prof. Melville Dozier.

Some Problems of Nutrition, by Dr. C. A. Whiting.

Detecting the Presence and Locating the Position of Ore Bodies in Mineral Veins by Electricity, by Mr. Fred H. Brown.

Recent Research in Radiant Energy and Search for Zero Temperature, by Prof. Edgar L. Larkin.

The Library, Historically and Locally Considered, by Miss Mary L. Jones.

Modern English, by Mr. A. L. Bancroft.

Some Practical Suggestions on the Study of Biological Problems of this Region with Special Reference to Animal Ecology, by Dr. A. B. Ulrey.

The Translation of the Sun through Space, by Prof. W. W. Campbell.

The International Dateline, by Prof. Melville Dozier.

Poison Oak and the Cause of its Poison, by Dr. Carl Schwalbe.

The Germination of Seed, by Dr. C. A. Whiting.

Glaciers, by Prof. J. F. Chamberlain.

Desert Mining and Observations on the Wayside on a 1000 Mile Tour over the Eastern part of San Bernardino County, by Mr. George W. Parsons.

Modern Technique in Neurological Investigation, by Prof. B. M. Davis.

FINANCIAL.

Receipts		
Cash on hand May 10, 1901	$223.89	
Total Receipts during past year	523.00	$746.89
Ezpenditures		
Rent	85.00	
Commissions on Collections	60.60	
Lecture Expenses	62.50	
Reception Expenses	16.00	
Postage Publications and Supplies	291.90	
Cash on hand with Treasurer	230.89	$746.89

MEMBERSHIP.

The total membership at the beginning of the fiscal year 1901-1902 was 134
The total membership at present is 216
Number of admissions to membership during year........ 78
Withdrawals 22
Deaths 4

NECROLOGY.

Prof C. Sjolander. Dr. Edward W. Claypole.
Samuel. M. Parsons. M. J. S. Parker.

PUBLICATIONS.

Commencing January, 1902, the Southern California Academy of Sciences has issued monthly a "Bulletin" of its Proceedings and Transactions. From its commencement this undertaking has proved an important factor in the advancement of the interests and purposes of the Academy. It has been the means of placing the Academy on the exchange list of nearly all the leading scientific institutions in this country. The total number of scientific publications received in this way since the first issue of the "Bulletin" was published amounts to 93.

It has been the purpose of the Committee on Publication to devote the "Bulletin" to the

Publication of Articles based on original Scientific Research.
Publication of the Transactions and the Minutes of the Academy, and its Various Sections.
Announcement of Publications received, and to
Scientific Notes of General Interest to the Members of the Academy.

That the "Bulletin" has been favorably received by other Scientific institutions is shown by the increasing demand for the five numbers so far published.

I append herewith a list of monographs based on original scientific investigation which have appeared in the "Bulletin":

A New Zauschneria........ Dr. Anstruther Davidson.
Aster Greatai .... Prof. S. B. Parish.
November Leonids of 1901 .... Prof. F. P. Brackett.
The New Erigeron........ Edward L. Greene.
The New Spectrograph of the Lowe Observatory .... Pof. Edgar L. Larkin.
Scrophularia Glabrata........ Dr. Anstruther Davidson.
The Germs Dirina in North America........ Dr. H. E. Hasse.
Silvery Footless Lizard or Snake .... Prof. J. J. Rivers.
A New Plant Louse from Southern California, T. D. A. Cockerel.
Discovery of Another Food Plant of Uranotes Melinus .... Prof. J. J. Rivers.
A Monograph on Pecten Aequisulcatus, Cpr. .... Mrs. M. Burton Williamson.

In every way the Southern California Academy of Sciences is in a prosperous condition. It is entering now on its twelfth year of useful activity with every prospect of continued success. While it has but a small balance to show in the bank, it has no indebtedness of any kind. Its membership is gradually increasing. Its library is growing rapidly. The general scientific activity among its members is unfailing and encouraging. On its membership roll may be found the names of many whose contributions to science are known far and wide.

Respectfully submitted, B. R. Baumgardt, Secretary.

Notes.

Dr. Adolf Kraemer, member of the Botanical Section, reports a new station for *Sphaeralcea Fendleri Californica,* Parish. Mr. Parish collected a single plant of this species near Colton in 1894. In 1899 a single plant made its appearance on the Campbell-Johnston Ranch (San Rafael Rancho). It was in a place exposed to cattle and children, and fearing its extinction, Mr. Austin Campbell—Johnston transplanted it and reports that it is doing well under cultivation. In publishing the plant, (Zoe, Vol. V., p 71; 1900) the authos states that a plant collected at San Pedro by Prof. McClatchie in May 1896 is probably this species, but the specimen was not in bloom. The new station descovered by Dr. Kraemer is at Glendale, roadside at edge of cultivated fields, near foothills. The plant is a welcome addition to the flora of the region; it is beautiful and inoffensive.

Mr. L. R. Abrams is at present in Los Angeles preparing for a botanical exploration of the coast ranges of Southern California.

We anticipate new discoveries by this ardent collector.

Mr. Chas. Amadon Moody, one of the members of the Botanical Section has sent in some specimens of *Morchella conica.* This has been reported by Prof. McClatchie as occurring in this region, but it seems to be seldom collected and the find is therefore interesting.

....*Ammanita phalloides* (Death Cup) is now to be found lurking under the oaks. Woe to him who mistakes it for an edible species. It is the most deadly of the fungi. There are at least two more species of *Ammanita* occurring here. One, like the Death Cup seems to prefer the seclusion of the oaks; the other is often found in the fields in company with Agaricus campestris. Both species are probably unnamed and untested as to their poisonous qualities.

A fine bronze bust of the late Dr. Edward W. Claypole, Honorary Member of the Southern California Academy of Sciences, and Professor of Geology in the Throop Polytechnic Institute of Pasadena, has been presented to that institution. the formal ceremonies taking place in the Assembly Hall on the anniversary of his birthday, June 2, 1902. Addresses were made by Past President Wm. H. Knight, of the Academy, and Dr. Norman Bridge, of the Board of Trustees. Dr. Claypole's most notable contribution to science related to the Ice Age and the formation of the great North American lakes, and his observations and conclusions were quoted and accepted as authority.

GEOLOGICAL NOTES.

BY DR. THEO. B. COMSTOCK.

The geology of California presents more features of interest and offers greater rewards to students than almost any equivalent field in the world. In a paper published more than eight years ago by one of the most vigorous workers, the following terse sentences well express the present situation as regards the more recent epochs.*

"No clearly defined ideas seem as yet to have been developed in geological literature as to the nature and extent of California in post-Pliocene time. * * * The recency of the record, the vastness of the events, the precision with which they may be established, all contribute to make it the most fascinating, as well as perhaps the most important chapter of our local geological history. * * * In no part of the continent is the interest so intense as in California. Nowhere is the

The Post-Pliocene Diastrophism of the Coast of Southern California. Andrew C. Lawson, *Bull. Dep't Geology, Univ. of Cal.,* Vol. 1, No. 4, p 116. Berkeley, 1893.

record so legible. Nowhere will greater discoveries reward the enthusiastic geologist. Yet how few have been the workers in this field! How scant are the opportunities afforded by State aid for systematic research!"

The field is large enough and enticing enough to engage the attention of numerous active workers for years to come. Speaking more particularly for Southern California, we are very deficient in literature bearing upon local geology. Professor Lawson, in the quoted paper, shows that the existing coastal margin has been uplifted in modern time from 800 ft. to 1500 ft., from the Golden Gate to San Diego, and that this movement was of wide extent inland, but of less degree in the "Valley of California," between the coast area and the Sierra Nevada.

Dr. Lawson's studies confirm those of Dr. A. S. Cooper, announced as early as 1863, and they also emphasize the fact, not always properly appreciated, that the whole region west of the Great Basin, or Plateau, has been and is now an area of orogenic displacement. The evidences afforded in numerous mines in Nevada, Arizona, California and Mexico, and in surface studies over a wide expanse in the same field, all point conclusively to the same generalizations.

The late Dr. E. W. Claypole had made equivalent deductions from his work in the Sierra Madre,* and the writer has verified and slightly extended the application in unpublished work along the coast from Santa Barbara to Santa Monica and in the low coastal ranges farther inland.

The theory of "isostasy," or equilibration, affirms that elevation and subsidence are due merely to adjustment of the equilibrum of a floating crust, from which follows the idea that sedimentation has caused the subsidence of large tracts and that erosion has been responsible for regional elevation in great measure. Dutton** carries the theory to its limit in suggesting that even volcanic action may result from the same isostatic tendency. The principle is as old as the writings of Lyell and Herschell, and it has been amplified and reiterated by the leading American geologists until very recently. The late eruption in Martinique and St. Vincent. West Indies, are probably rightly attributed largely to this cause in their local effects. LeConte, in 1859, and other eminent geologists in later years, have given adherence to this explanation of vast earth movements, but in 1884 and subsequently Dr. LeConte sided with a new school of students who have come to regard this cause of undulation in the crust as of minor importance. These hold that "the converse proposition is much more true, viz.: that subsidence is the cause and necessary condition of sedimentation, and elevation the cause of exceptional erosion."† A very interesting paper, published in 1896, by F. Leslie Ransome‡, criticises the theory of isostasy as applied to the region between the Sierra Nevada and the Coast ranges. The discussion cannot be narrowed to this region, however, and the work of Lawson in the coast areas is quoted by Ransome in partial support of his contentions. We have here a striking illustration of our initial thesis; for, as Dr. Claypole remarks, in the paper previously cited, "geologists who have worked principally in the East witness with surprise the enormous development and the excessive diastrophism exhibited by Tertiary and even very late Tertiary strata in the West, and these characters are as well seen in California as in any other Western state.

It is not proper to leave this subject without mention of Dr. Lawson's reconnoissance north of the Golden Gate, where he obtained evidence of very similar history in the recent elevation of the coast.‡‡

**Sierra Madre near Pasadena*. E. W. Claypole. Paper read before the Cordilleran Section, Geol. Soc. America. Abstract published in *Bull. Geol. Soc Am., Vo,.* 12, 1900.

***Hawaiian Volcanoes*. 4th annual report, U. S., Geol. Surv., 1884, pp. 190-195.

†*The Elevation of the Sierra Nevada,* Amer. Journ. Sci., Vol. CXXXII, 1886, p. 167.

‡*The Great Valley of California*. Bull. Dept. of Geol., Univ. of Cal. Vol. 1, No. 14, p. 371.

‡‡The Geomorphogeny of the Coast of orthern California. Bull. Dept. Geol., Univ. of Cal., Vol. 1, No. 8, p. 241, Nov. 1894.

Mr. Oscar Hershey, of Berkeley, has also done some work in Southern California. His paper on the Quarternary * and another of later date, on earlier strata** present modestly an outline of the general structure, which is more complicated and interesting than has been usually understood by geologists unfamiliar with the region. Numerous movements of elevation and subsidence, which have extended over vast areas from the Rocky Mountains to the Pacific Coast, have been almost overlooked until within recent years. The labors of various members of the U. S. Geological Survey and of the staffs of the Universities at Berkeley and Palo Alto have been fruitful of results. And some good work has been done also by the State Mineralogists's corps in different years, particularly by Cooper, Watts and Bailey. But there is a dearth of investigators in Southern California. We have competent men in the local colleges and it should become one of the main objects of the Geological Section of the Academy of Sciences to organize and sequester the records, which abound in this locality, of geologic phenomena of great interest, easily studied. Hershey shows, in his paper on the Quaternary, that "aside from the marine terraces pretty thoroughly discussed by Lawson,† Fairbanks‡ and Smith‡‡, and the associated sands and gravels studied by Arnold, the Quarternary of Southern California is virtually a virgin field." Mr. Ralph Arnold's paper was read last December before the Cordilleran Section of the Geological Society of America, but has not yet fully appeared in type. Only a few salient points in the discussion, can here be lightly touched. Once more the amiable controversy between field geologists and office paleontologists, which Mr. Bailey Willis has recently been attempting to clear up in a measure, crops out in the effort to define a conventional break between Pliocene and Pleistocene strata in California. There is a profound orographic element which is not always represented by abrupt changes in fossils, and Mr. Hershey justly claims that physical criteria are of greater moment in recent stratigraphy than any variations in faunal types which could possibly occur under the known conditions of those closely related periods. On this score he demurs in part to the correlation tables proposed by Arnold and others.

The skeleton of our local geology may thus be broadly summarized: The Sierra Madre-San Bernardino range, and the Tehachapi range—uplifted to some extent as a part of the Sierra Nevada orographic disturbance, and probably rising more or less gradually for a long continued era of pre-Tertiary times,—furnished by erosion a vast accumulation of detritus which was carried downward to the ocean, forming thick sedimentary terranes through the Tertiary Period. Moderate disturbances in earlier epochs, accompanied by volcanic outbursts, culminated at the close of the Pliocene in the great movement above mentioned, which has elevated portions of the old Pliocene plain from 3000 ft. to 8000 ft. Mr. Hershey traces much of the Sierra Madre uplift also to this epoch, and he shows that the great Antelope Valley, north of these mountatins, was separated from that by faulting which occurred at the beginning of the Quarternary. Since then our local area has been mainly rising by successive minor throes until we have numerous terraces of Quarternary and recent beach gravels and alluvial deposits.

This is the coast border which has for long been gradually reclaiming from the sea. Professor Hershey has begun the work of unraveling the skein of superficial layers and he outlines five epochs of Quarternary (Pleistocene) time, as below (the first being earliest):

1. *Santa Claran Epoch,* characterized by erosion with land level normal.
2. *Red Bluff Epoch,* characterized by deposition, land level below normal.
3. *Los Angelan Epoch,* erosion of normal land surface.

**The Quaternary of Southern California.* Bull. Dept. Geol., Univ. of Cal., No. 1, p. 1.

***Some Crystalline Rocks of Southern California,* American Geologist, Vol. XXIX, No. 5, May, 1902, p. 273.

†*loc. cit., ante.*

‡*Oscillations of the Coast of California during the Pliocene and Pleistocene.* Dr. H. W. Fairbanks. Amer. Geol., Vol. XX, Oct., 1897, pp. 213-245.

‡‡*A Topographic Study of the Islands of Southern California.* W. S. Tangier Smith. Bull. Dept. Geol. Univ. of Cal., Vol. 2, No. 7, Sept., 1900, pp. 179-230.

4. *San Pedran Epoch,* deposition with surface below normal.

5. *Not named* Epoch, of erosion prior to glacial epoch. This is assumed on the author's premise that the San Pedran epoch is properly correlated with the Iowan epoch of eastern geologists.

There is doubt of the propriety of the foregoing assumption, which Mr. Hershey clearly admits.

The Modern Epoch is represented by the flood-plains of our present rivers, and it is regarded as an epoch of deposition, with land level below normal.

The marine Pleistocene, well exposed in Los Angeles, on Boyle Heights, is referred to the Red Bluff epoch by Hershey; his Los Angelan epoch is here represented by the silted-up valley of the ancient river, well shown near the County Hospital and in the low terrace running partly through the city east of Main Street; the Modern epoch alluvium, forming the flood plain of the present Los Angeles River, is the next Quarternary representative know to exist in San Pedro hill, near the coast, overlying deposits of the earlier epochs. The marine formations at the base of the hill are tentatively referred to the Red Bluff epoch.

The late volcanic eruptions on Martinique and St. Vincent have proved a "nine days' wonder" for the newspaper writers, but the scientific import has been but barely touched as yet. Aside from the dynamic geological features, which we may have occasion to discuss hereafter, there will undoubtedly be many very startling revelations in physiography, terrestrial physics, chemical geology and other branches of enquiry. We may look for the tinted atmosphereic effects hereabouts within a few weeks. In a former instance of the kind, trained observers were enabled to deduce new and unexpected movements of ærial currnts actually following them by the dust tracks several times around the earth. Chimical studies of the ash accompanying the recent West Indian outbreaks show that the quality of material is unlike that thrown out half a century earlier, and some interesting conclusions have already been drawn concerning the gaseous products of eruption, which are supposed to have been the immediate cause of the annihilation of the inhabitants.

In some respects, in minute degree, our local coast and insular geology is akin to that of the West Indies, but we cannot predict the future history with certainty from our limited understanding of the sub-structure. The theory of isostasy has, at first glance, received unwelcome support from the catastrophe of Martinique, but it is too early to generalize on that subject. From the investigations already undertaken by members of the U. S. Geological Survey much valuable knowledge may be anticipated. Dr. Angelo Heilprin and Dr. Robert T. Hill have gone to study the district for that organization.

The U. S. Geological Survey has just issued Sheets 1 and 2, (of a series of three maps of Southern California), including Orange County, the major portion of Los Angeles County and parts of Riverside and San Bernardino counties. The scale is approximately four miles to the inch, size 21 in. x 33 in. Price 10 cents each; to be had on application to the Survey at Washington, D. C.

As this BULLETIN goes to press, we receive word that Dr. Robt. T. Hill, Professor Israel C. Russell and C. E. Borchgrevink went together, on the *Dixie* relief
fessor Israel C. Russell and C. F. Borchgrevink went together, on the *Dixie*
ciety, of Washington, D. C. The selection has been peculiarly fortunate and we shall soon have authentic information from these gentlemen, all of whom are acknowledged authorities in this line of study. Dr. Hill has predicted the eruptions for a long time past.

Transactions.

ACADEMY OF SCIENCES

Los Angeles, May 13, 1902.

The regular monthly meeting of the Academy was held this evening at 724 South Broadway.

President Wm. H. Knight occupied the chair.

New members were elected as follows: Dr. A. Conrad, Mr. J. M. Clark, Mr. Lucius K. Chase, Dr. LeMoyne Wills, Dr. W. Jarvis Barlow.

The report of the Secretary and Treasurer for the fiscal year ending May 13, 1902,, was read and approved. (The report is published in full in this number of the Bulletin.)

A motion was made that a committee be appointed by the Chair for the purpose of nominating a Board of Directors to serve for the year 1902-1903. Carried. The Chair appointed the following Nominating Committee: Dr. Woodbridge, Dr. Emery, Mr. Macleod, Mr. Collins and Secretary Baumgardt.

The Committee, after having retired for deliberation, returned the following ticket:

William H. Knight	G. Major Taber
Anstruther Davidson, M. D.	J. D. Hooker
Dr. John R. Haynes	Prof. Melville Dozier
Dr. T. B. Comstock	Dr. S. M. Woodbrige
George R. Parsons	Dr. C. A. Whiting
B. R. Baumgardt	

A motion was made and seconded that the candidates named by the Nominating Committee be elected a Board of Directors for the year 1902-1903. Carried.

The Chair then announced the new Board of Directors.

The remaining part of the evening was devoted to the reading and discussion of an article by Professor Simon Newcomb, entitled "The Problem of the Universe."

Adjourned. B. R. BAUMGARDT, Secretary.

BIOLOGICAL SECTION.

Regular meeting.

Report of observations on weight of chick egg during incubation was given by J. O. Hunt. The loss was nearly uniform until day before hatching. Total loss was 20 per cent. of weight of egg before incubation. Unfertilized eggs showed uniform loss for same time with a total loss of 15 per cent.

A report on growth of moulds was given bv Miss Louise Burns. The paper was illustrated by camera lucida drawings of different stages. Her experiments showed that certain kinds of mould had the power of forming starch grains from the filtered juice of potato and other starch-forming plants.

GEOLOGICAL SECTION.

The Geological Section of the Academy of Sciences met at Ebell Hall on Tuesday evening, May 27th. Chairman George W. Parsons occupied the chair.

The minutes of the previous meeting were read and approved.

After a few preliminary remrks, the Chairman introduced Prof. G. E. Bailey as the speaker of the evening.

His subject was "Death Valley, Its Geological Origin, Saline De-

posits, Topography, Scenery, Climate and Water Supplies." The speaker gave an intensely interesting description of the desert, describing it as a great storehouse of mineral wealth which in time would be developed and utilized. He stated that the great valley between the Sierra Nevadas on the west and the Wasatch range of mountains on the east, was once a great lake, and that the large deposits of nitrates, soda and borax found on the Mojave desert owed their existence to a similar process of long continued evaporation. The lecturer claimed that this barren waste was a storehouse of wealth preserved by nature for what the adjacent country most needed. He estimated that in the past year through the shipment of oranges from Southern California there was taken from the soil 5,000 tons of nitrogen which could be replaced from the nitrates of the desert. The lecture was full of incidents and suggestions.

A vivid description was given of the oppressive lonliness and deathlike stillness of the desert, and it was stated that sometimes men in crossing Death Valley lost their reason when too much alone.

The lecturer congratulated the Academy upon the good work accomplished, which he asserted deserved the hearty support of the citizens of Los Angeles.

Upon motion, Prof. Bailey was tendered the thanks of the audience by a rising vote for his interesting lecture.

Mr. W. H. Knight gave notice of a meeting to be held at the Throop Institute on June 2nd at which time a bust of the late Prof. E. W. Claypole would be presented to that institution.

Adjourned. G. MAJOR TABER,
Secretary.

BOTANICAL SECTION.

The regular meeting was devoted to the examination of a collection of Carices from the herbarium of Dr. Kraemer. The secretary reports the completion of the numbering and cataloguing of the botanical collection. Reports of the field meetings were made; the following places having been visited during the month of May: Glendora, Azusa, San Antonio and "Old Baldy mountain, Rivera, Studebaker, Nigger's Slough, Redondo, Santa Monica Canyon, and Laurel Canyon. As the result of these explorations quite a few new records have been made for Los Angeles County and Southern California, full details of which will be published in future numbers of the Bullitin.

L. A. GREATA, Secretary.

BOARD OF DIRECTORS.

Los Angeles, May 17, 1902.

The first meeting of the newly elected Board of Directors was held this afternoon at room 2, Bryson Block, Los Angeles.

The Directors present were: Knight, Davidson, Comstock, Whiting, Taber, Parsons, Baumgardt.

The Secretary announced that the purpose for which the Board had convened was the election of Officers.

The Board elected officers as follows:

President ....Dr. T. B. Comstock
First Vice-President..........................J. D. Hooker
Second Vice-President.....................Prof. Melville Dozier
Treasurer...........................Dr. Anstruther Davidson
Secretary.................................B. R. Baumgardt

Adjourned. B. R. BAUMGARDT, Secretary.

PUBLICATIONS, ETC., RECEIVED

List of Bulletins and Circulars issued bv the U. S. Dept. of Agriculture, and available for distribution. Corrected to October 15, 1900.

Methods of Steer Feeding. The Pennsylvania State College Agricultural Experiment Station. Bulletin No. 57.

The Tuberculin Test of Imported Cattle, United States Department of Agriculture. Bulletin No. 32.

Extermination of Gophers and Ants; University of Arizona Agricultural Experiment Station. "Timely Hints," No. 39.

The Instability of the Rochester Nomenclature, by M. L. Fernald. A reprint from the Botanical Gazette, November, 1901.

The Northeastern Carices of the Section Hyparrhenae, and the Variation of some boreal Carices, by Fernald. Contributions from the Gray Herbarium of Harvard University. No. 22.

Fertilizer Inspection, Maine Agricultural Experiment Station. Bulletin No. 81.

Feeding Stuff Inspection. Maine Agricultural Experiment Station. Bulletin No. 80.

Field Operations of the Division of Soils, United States Dept. of Agriculture, 1900. The Algerian Durum Wheats: A classified list with descriptions. United States Dept. of Agriculture. Bulletin No. 7.

Las Rhyolitas de Mexico. Boletin del Instituto Geologico de Mexico. No. 15.

Bulletin of the State University of the State of Missouri. Vol. 3. No. 2.

Observations on the rise of Alkali, University of Arizona Agricultural, Experimental Station. No. 40.

Experimental Station Record, United State Office of Experiment Stations. Vol. 13. No. 7.

Bulletin of the New York Botanical Gardens, Vol. II, No. 7.

The opening chapters of the Prehistoric History of California, which we promised our readers to begin in this issue have, through lack of space, been held over for one month.

VOL. I. JULY 1, 1902 NO. 7

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION:

A. DAVIDSON, C. M., M. D., Chairman

MELVILLE DOZIER T. B COMSTOCK, Ph. D.

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Sandstone and Shales. North Side of West End of San Miguel Island.

Volcanic Cliff, Altitude 300 feet, San Miguel Island

Volcanic Bluff, Altitude 300 feet, Easterly End of San Miguel Island, With Distant View of Western Extremity of Santa Rosa Island

BULLETIN
OF THE
Southern California Academy of Sciences

VOL. I LOS ANGELES, CAL., JULY 1, 1902. NO. 7

231 West First Street.

PRECHISTORIC CALIFORNIA,

Its Topography, Flora and Fauna—With the Evidence of the Time of the Advent of Man, and His Development, From the Records of His Past Found in the Soil.

BY DR. LORENZO GORDIN YATES.

In the following pages an attempt will be made to present to the mind of the reader some idea of the appearance and conditions prevalent in what is now known as California, previous to ,and at the time of the first appearance of its human inhabitants.

And later to illustrate and describe a sufficient number and variety of the unique and interesting implements and other evidences of man's occupancy of the region, to assist the student in unravelling the mythical history of the aboriginal tribes and peoples who have become, or soon will be extinct. And, further, to preserve the records of some of the most characteristic forms of the handiwork of the vanishing race, or races of Prehistoric California, especially as many of these forms have been selected from the few collections with us which are liable to be removed from the State, unless more interest is taken to retain them than has been in the past.

Many of the originals from which the illustrations to be used in the following pages were made, have, since the writer executed the drawings, been removed to other States and countries.

As to the success of the writer's efforts to throw light on the dark pages of the history of the former inhabitants of California, each reader must decide for himself, for where so few reliable data are available and such widely different opinions prevail, no one writer can be expected to decide satisfactorily upon the relative merits of so many diverse theories.

To the pursuit of material for the elucidation of the objects herein specified, the writer has, during the past forty years, devoted much time and study.

This line of research has been carried out by systematic and thorough exploration of aboriginal village sites, mounds, burial places, shell heaps, islands, caves, rock shelters, ancient trails,

temporary camping places, of objects scattered over the surface of the ground, and the results of mining exploitation.

And, further, by a continued search for, and study of, the animal life of the region, from its earliest appearance to the present time, especially with a view to ascertaining what species of animals occupied the region anterior to, or, contemporaneous with, our "oldest inhabitants." The correct answers to these questions throw much light upon the subject under consideration, as will hereafter become apparent.

TOPOGRAPHY.

In order that we may be able to realize something of the great changes in the topography of California which preceded the advent of its human inhabitants, it is deemed necessary to go back in the world's history to the close of the Cretaceous or Reptilian Age, at which time the region now known as California —with the exception of the Sierra Nevada Mountain Range, and portions of the Coast Range—was lying at the bottom of the ocean.

It is probable that some portions of the Coast Range, as well as of the Sierras, formed detached islands in the Cretaceous ocean.

During the Cretaceous Age a large portion of the present continent of North America, including the Rocky Mountain Region, was under water, as shown by the marine and fluviatile deposits now found in the regions which, at that time, formed the ocean's bed.

The Gulf of Mexico extended northward along what is now the Valley of the Mississippi to the confluence of the Ohio and Mississippi rivers, where a great bay received the waters of those rivers.

Westward it extended to the region of the Colorado River, and probably to the Pacific Ocean, and from the southern portion of California a cretaceous sea flanked the eastern slope of the Sierra Nevadas, extending northerly to the Arctic Ocean, where the Mackenzie River and its tributaries are now found.

It also covered the present watershed of the Missouri and Yellowstone rivers. Cretaceous seas covered the "Great Plains" Prairie region and the summits of parts of the Rocky Mountains, to where the eastern slope of the Wahsatch Mountains now are.

These lofty ranges have since been raised, and in part the elevation took place before the epoch of the Tertiary, whose marine beds lie at their base.[1]

Abundant evidences of this extensive submersion during the Cretaceous Age are found throughout California.

1. See Dana's "Manual of Geology," pps. 490 and 503.

Large areas in Butte, Lake, Shasta and other counties lying north of the Bay Region; and in Contra Costa, Alameda, and other counties south of that region, and on the eastern slope of the Coast Range nearly the entire length of the San Joaquin Valley show cretaceous strata, and prove their submersion at that time.

In Santa Barbara and the northern portion of Ventura, there is undoubted evidence that the entire region during the Cretaceous Age was submerged to a great depth.

In the southeasterly portion of Santa Barbara County, at an elevation of seven thousand feet above the sea, the writer found well preserved shells of cretaceous age, Ammonites, Aucellas, Dentaliums, etc.

Allowing for the erosion of past ages, since the mountains were uplifted, and for the depth of their submersion while being formed, it is probable that an elevation of at least two miles above sea level has occurred at that point, ("Pine Mountain of Santa Barbara").

The estimated depth of the deposit is "at least twenty-five thousand feet," [2] thus indicating for the lower portion of the deposit, which is exposed at some distance easterly, an elevation of five or six miles, without taking into consideration the depth of the water in which the deposit was made.

In San Benito County, on the eastern side of the Mt. Diablo Range, there is an exposed thickness of twenty thousand feet of rocks of this age.

Thus it will be seen that the Pacific Coast of that time was probably connected with, and was practically a part of Asia, a wide sea separating it from the portion of the present continent east of the Wahsatch Mountains; while Florida, Texas, New Mexico, Louisiana, Alabama, Georgia, Mississippi, Indian Territory and other portions of the country now lying south and east of the confluence of the Ohio and Mississippi rivers were submerged, together with portions of Colorado, Wyoming, Montana, Nebraska, Dakota, and a large portion of Western Canada, and the Pacific Ocean extended to the foothills of the Sierra Nevada Mountains.

We now come to what the late Professor Joseph Le Conte termed "one of the Critical Periods of the History of the Earth."

These Critical Periods he defines as "periods of very general readjustment of the crust of the earth, and therefore of widespread changes in physical geography, so great and so general as to affect profoundly and widely the climates of the earth. These physical changes, in their turn, gave rise to still more

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2. Fairbanks in "Geology of the Coast Ranges," p. 95.

marked changes in organic forms; and finally all these changes together form a rational basis for the primary divisions of time." [3]

He gives as one of the signs of Critical Periods, the birth of great mountain ranges.

This Critical Period brings us to the Tertiary or Mammalian Age, inaugurated by the bodily upheaval of the whole western half of the continent, so that the great interior Cretaceous sea, which had previously divided North America into two parts, was drained off, and the continent became one, so that this great "Critical Period" was a continent making, as well as a mountain making period, and the climatic changes were doubtless commensurate with the change in the physical geography.

At the commencement of the Cretaceous period the sediments accumulated along the then Pacific shore bottom, during the Jura-trias period, yielding to the lateral pressure, were mashed together and swollen up into the Sierra and Cascade Ranges. (Le Conte).

This change in the topography of the Pacific Coast, marked by the elevation of those ranges (which in time reached to 6,000 or 7,000 feet) was gradual. The rivers were therefore at first smaller than now, and the region, as Hayden inferred from the great fresh-water Tertiary deposits, was covered by one or more vast fresh-water lakes. (Dana).

This change also resulted in the formation of the long peninsula, and the islands which were the nuclei of the present Coast Range system of this region.

The geological evidence shows that, as I have already shown, the Cretaceous sea was very deep over Southern California, so deep that in many places there is an almost entire absence of fossil organisms, thus presenting great difficulties to the proper reading of the pages of the geological history of the region.

Over Central and Northern California the indications are that there was a gradual rise from the abysmal depths to more shallow water.

We find in Alameda, Contra Costa, Butte, Shasta and other interior counties, that the marginal bottom of the Pacific Ocean teemed with molluscous animal life; in some places the cephalopods are represented by immense numbers of individuals of many species of Ammonites, Baculites and their contemporaries in such a remarkable state of preservation that the iridescence is as finely shown as in our most beautiful living shells.

At other localities the near proximity of the dry land of the period is indicated by the presence of fossil wood, some of which

3. LeConte's "Elements of Geology."

shows the work of the Teredos or allied genera; and the shallowness of the water is shown by the fossil remains, or casts, of Fucoids and other marine plants.

After this elevation of the western portion of the continent, and the formation of the Coast Range, by folding of the strata, and subsequent to a period of erosion, the entire region was again submerged, and the eroded summits of the mountains of Cretaceous and Eocene (older Tertiary) sedimentary formations were buried under several thousand feet of sediment at the bottom of the Miocene sea.

This later formation consists of sandstone, light-colored, banded slates, and gypsum-bearing clays.

(Some of the results of this submersion may be seen in the Miocene capping the present mountain ranges. In some instances the horizontal strata of Miocene age may be seen capping the nearly vertical strata of the later Cretaceous or Eocene rocks at altitudes of about five thousand feet.)

While the former elevation drained the Cretaceous sea of the region, the submergence following it allowed the Miocene sea to occupy the place of the former Cretaceous, the elevation of the Miocene period raised barriers which formed an inland sea which continued during a part of the Pliocene period.

After this came a series of elevating and sinking movements in the region. The Pliocene sea broke through the barriers and was drained into the Pacific Ocean, and the present interior valleys were occupied by fresh-water lakes, and still later by the bodies of salt water now occupying the so-called "Bay Region" of Central California.

Referring again to the Post-Cretaceous period, we find that the remarkable changes in the physical geography of the earth's crust resulted in corresponding climatic variations.

These culminated in a revolution in the organic life of the time, which was perhaps the greatest which has occurred in the world's history.

The evidences of these great surface alterations are seen in the almost universal unconformity of the rocks of the Tertiary strata with those of the Cretaceous and other periods which preceded it.

The unconformities and breaks in the record characterizing this critical period are almost universal throughout the world, the most notable exceptions being the plateau region of the North American continent, and some portions of California, where the crust oscillations appear to be less marked, and the stratification is doubtfully continuous.

The next critical period occurred at the close of the Tertiary, when another great revolution took place which resulted in the destruction of a large part of the organic life of

the period, and the substitution of new and more dominant forms.

The climatic conditions resulting from the changes in the physical geography, permitted, or caused, the migration of animals and plants.

Later migrations were also forced by subsequent changes and the resulting environments, and were further made possible by the land connections between continents and contiguous islands, (previously separated by bodies of water) by the elevation of the land.

This elevation, connected possibly with astronomical and other causes not thoroughly understood, brought about the Glacial Period, which may be termed the last critical period which has occurred.

This was also attended by well-marked oscillations of the earth's crust by elevations and depressions, and especially is this apparent in high latitudes where the immense areas of the ice bodies, gradually flowing towards the equator, planed down the most accentuated irregularities of the surface caused by the upheavals.

These ice bodies picked up large bodies of projections upon which they were formed, or with which they came in contact, and transported them to long distances, crushing and grinding them up on the way by their irresistible power, thus forming boulders, gravel, sand, and soil, which, as the ice approached the less elevated and warmer latitudes and was gradually melted, were deposited in the valleys and on the plateaus.

It will be thus seen that, the glaciers were important factors in preparing the earth for its occupancy by man and the higher animals, and as will be shown as we proceed, the ice drove animal and vegetable organisms towards the equatorial regions, causing an admixture of the faunas and floras of widely separated regions.

After the recession of the great ice fields and glaciers consequent upon another depression, there came a period when our coast enjoyed the advantages of a tropical climate, during which time many genera of plants and animals inhabited the land and probably continued until the epoch of volcanic disturbances, when, instead of being buried under a sheet of ever-moving ice, the country was overwhelmed by a cataclysmic flow of molten lava, which doubtless destroyed all the animal and vegetable life of the region, filling up the river channels, and engulfing the mountains of ordinary altitudes; a time when the higher peaks, instead of being islands surrounded by ice fields, or water, were left projecting from an immense sea of molten lava, which congealed and may be still seen spreading over vast areas of land. (To be continued).

A New California Rose.

BY S. B. PARISH.

ROSA MOHAVENSIS SP. NOV. (*R. Californica glabrata,* Parish, Erythea, C. 88. (1898).

Stems slender, 5-10 dm. long, destitute of infrastipular spines, but armed with slender scattered prickles, which are straight or nearly so; glandless and glabrous throughout, except the inner surface of the sepals, which are canescently tomentose; leaves crowded on short branchlets; stipules narrow; leaflets 3-5, oval, 5-15 mm. long, mostly obtuse at apex, cuneate or narrowed at base, serrate with erect teeth, shortly petiolate; flowers solitary, or in corymbs 2-3, short pedicellate; sepals lanceolate-accuminate, the tips enlarged; petals 4 pink obovate, entire, about 15 mm. long; styles distinct; fruit (immature) ovoid-globose, contracted into a short neck.

Type *2481 Parish,* June 1, 1892, collected by watercourses at Cushenberry Springs, at the desert foot of the San Bernardino Mts., alt. about 4000ft. Since received from Mr. H. M. Hall, who collected it in 1900 on the desert slope of San Antonio Mt. Also collected long ago at Rock Creek, in the same region, by Dr. Davidson, and probably not uncommon on the borders of the Mohave Desert.

It is, indeed, the desert analogue of *Rosa Californica.* Ch. & Schl., from which it differs in the smaller size of all its parts, and in the absence of infrastipular spines, or of any glandular or hirsute indument. Even on young and vigorous shoots the leaves, which are then more distant, have leaflets (about 7) not exceeding 25 mm. in length. Early in June of last year I again had an opportunity of observing this rose at the type station, and it appeared so distinct that I ventured to propose specific rank for it. In doing so I avail myself of this occasion to change the name formerly given, and which had been used already more than once in the genus.

The figure is drawn from a specimen collected June 2, 1901, at Cushenberry Springs, by Mr. Louis A. Greata and myself.

San Bernardino.

Additions to the Flora of Los Angeles County, I.

BY LE ROY ABRAMS.

Pinus Murrayana Balf. Summit of Mt. San Antonio.

Sitanion rigidum J. G. Smith. Summit of Mt. San Antonio.

Bromus carinatus Californicus (Nutt.) Shear. Fruitland, along irrigating ditches.

Lepturus cylindricus Trin. Mesmer.

Rosa Mohavensis. Plate VII.

Melica imperfecta minor Scribn. Canyon near Chatsworth Park.

Phalaris Lemmoni Vasey. Inglewood.

Argopyron Parishii laeve Scribn. & Smith. Ballona Creek, near Mesmer.

Alopecurus geniculatus L. Not typical, perhaps a distinct form. Mr. Elmer D. Merrill of the Department of Agriculture informs me that the same form has been collected near San Diego.

Quercus lobata Nee. There are some excellent trees of this species at Chatsworth Park.

Quercus Wislizeni A. D. C. This species is frequent on the coast slope of the Sierra Madre Mountains. I have also obtained it in the San Antonio, San Bernardino and Santa Ana Ranges. Only the scrubby form seems to occur with us, and it has been confused with *Quercus dumosa* Nutt.

Castanopsis sempervirens (Kell.) Dudley, N. A. Fauna, No. 16, 1899. (*Cantanea sempervirens* Kell. Proc. Calif. Acad. 1: 71. *Castanopsis chrysophylla* Parish, Zoe 4: 346, not of A. DC.)

This species occurs in the San Antonio Mts., above 8000 ft.

Eschscholtzia Californica Cham. Sierra Madre; Chatsworth Park.—Perennial.

Eschscholtzia peninsularis Greene. The common species.—Annual.

Eschscholtzia hypecoides Benth. Saddle Peak, Santa Monica Mts.

Lepidium lasiocarpum Nutt. Sand-Dunes, Ballona Harbor. ~~Related to *L. oxycarpum* T. and G.~~

Arabis Virginica (L.) Trelease (*A. Ludovicianum* C.A.Meyer.) Inglewood.

Heuchera elegans Abrams. Wilson's Peak; Mt. Lowe. *Heuchera rubescens* of local lists, not of Torr.

Heuchera rubescens Torr. Mt. San Antonio.

Ribes cereum Dougl. Mt. San Antonio.

Ribes malvaceum viridifolium Abrams. *R. glutinosum* of local lists, not of Benth. San Gabriel Mts. above 3000 ft.; Santa Monica Mts.

Horkelia platycalyx Rydb. Indian Hill, Claremont.

Horkelia sericea (Gray) Rydb. Ballona Harbor, edges of sand-dunes.

Cercocarpus ledifolius Nutt. Mt. San Antonio, 9000 ft. alt.

Lupinus gracilis Agardh. San Fernando Mountain.

Astragalus Parishii Gray. Chatsworth Park.

Butterfly Emigrants.

BY PROF. J. J. RIVERS.

Is the climate changing in California? Certain southern butterflies have taken up their abode in Santa Monica that formerly were not credited to this locality, viz., *Callidryas eubule,* Linn.; and *Terias nicippe,* Cram. Both these butterflies are among the commonest butterfly residents, and have taken up permanent quarters. Extending the area of their domain could not be successful on climate alone, as these species are particular as to their diet. *C. eubule* is known to feed upon Cassia and Trifolium. The inhabitants here have a great liking for the blazing, flowering *Cassia floribunda,* and have planted it extensively; the butterflies are equally rejoiced, and have shown great appreciation by establishing themselves in great numbers upon every tree to the detriment of its beauty, thus causing an antagonistic attitude on the part of the inhabitants, and many shrubs have been already rooted out.

Ocean Park, Cal.

Publications, Etc., Received.

Bulletin of the New York Botanical Garden. Vol. 2, No. 7.

Water supply and Irrigation papers of the U. S. Geological Survey, Nos. 57 and 61.

Report of the Maine Agric. Station, 1901.

Cell Studies I. "Spindle Formation in Agave," by W. J. V. Osterhout, Proceed. Cal. Acad. Sci. Botany, Vol. II, No. 8.

"New Species from the Sierra Nevada Mountains of California," by Alice Eastwood. Proc. Cal. Acad. Sci. Botany Vol. II, No. 9.

"Some New Species of Pacific Coast Ribes," by Alice Eastwood. Proc. Cal. Acad. Sci. Botany Vol. II, No. 7.

"The Quaternary of Southern California," by Oscar H. Hershey, Univ. Cal., Dept. Geology. Vol. 3, No. 1.

Minnesota Botanical Studies. Part VI.

"The Seeds of Rescue Grass and Chess." U. S. Dept. Agricult. Bull. No. 25.

In Memoriam: Edward Waller Claypole. Throop Polytechnic Institute.

"A Descriptive List of the Plants Collected by Dr. F. E. Blaisdell at Nome City, Alaska," by Alice Eastwood. Reprint from the Botanical Gazette.

"Insect Enemies of the Pine in the Back Hills Forest Reserve." U. S. Dept. Agricult. Bull. No. 32.

"Colemanite from Southern California: a Description of the Crystals and of the Measurement with the Two Circle Goniometer," by Arthur S Eakle, Univ. Cal. Dept. Geology. Vol. 3, No. 2.

Eparchæan Interval, a criticism of the use of the term Algonkian, by Andrew C. Lawson, Univ. Cal. Dept. Geology. Vol. 3, No. 3.

Transactions.

ACADEMY OF SCIENCES—ANNUAL RECEPTION.

The regular June meeting of the Academy, the last of the season of 1891-1902, was held at the Woman's Clubhouse on Tuesday evening, June 10, 1902.

Retiring President Wm. H. Knight conducted the proceedings. In his introductory remarks he stated that eleven years ago a little band of 21 persons interested in general science, and especially in learning more of the scientific features of our region and environment, organized the Southern California Science Association, which name was subsequently changed to the Southern California Academy of Sciences.

The society first met in the hall at 119 Spring street, but owing to increase in numbers—now 240—and the march of improvement in the city, the Academy has since occupied the halls, successively, at 330 Broadway and 724 Broadway for its general meetings, and such other halls as were convenient for its section meetings. The new board of officers hope to secure a permanent home where all the meetings can be held and the library and collections can be accommodated.

New members were elected as follows:

E. Bennet Adams.	W. J. Schaefle.	Prof. F. P. Brackett,
R. H. Behrens.	D. L. Durand.	Samuel S. Partello, M.D.
H. A. Behrens.	Mark R. Lamb.	James R. Rogers, Ph. D.
Wm. J. Canfield.	Alfred Fellows, M.D.	

The report of the Committee on Modern English was referred to the Board of Directors for further consideration.

Hon. Abbot Kinney addressed the meeting on "How to Identify the Forest Trees of Southern California without being a Botanist." His instructive remarks were illustrated by branches and cones of the the different varieties of pine, fir, spruce and other trees found on the slopes of the Sierra Madre and other ranges of mountains in this region. He explained how the pine needles spring in groups of from one to five from a single sheath, according to the species to which they belong, and described the characteristics of the cones peculiar to each variety.

The Pinus monophylla, (Pinon) has one leaf or needle in sheath, nut edible, small globose cone .

The Pinus contorta, (Tamarack pine) has two short leaves, small cone, thin bark with resinous exudations.

The Pinus ponderosa, (Yellow pine) has three emerald green leaves, yearling cone green, when ripe oblong. Bark in plaques like alligator skin.

Pinus Jeffreyi, (Black pine) three paler leaves, yearling cone purple, when ripe large and pyramidal; found higher on the mountains than the yellow pine.

Pinus Coulteri, (Coulter pine) has three very long leaves; largest pine cone in the world, sometimes weighing 8 to 10 pounds, and with large hooks on scales.

Pinus altenuata has three leaves, cone horn-shaped, only opens after long periods.

Pinus insignii, (Monterey pine) three leaves; medium sized cone with knobs near base; a coast pine.

Pinus quadrifolia, four leaves but not regular; small cone; found on the San Jacinto mountains.

Pinus Lambertiana, (Sugar pine) five short, bluish green leaves; cones longest in the world; bark dark with reddish or purple tinge.

Pinus albicaulis, (flexiler) five dark green leaves, bark white; found only near snow line.

Pseudo-tsuga macrocarpa, (Southern California spruce) short, flat leaves springing from short stem; long pendant cone has three-pronged bracts protruding between scales.

Abies concolor, (Balsam fir) short leaves without stems; dark bark; cylinder-shaped cones stand erect on limbs, and when ripe scales fall off.

Libocedrus decurrens, (Incense cedar) flat, bright green leaves; small horn-shaped cone; bark light yellow to cinnamon, in long ridges.

The acorns and leaves of four characteristic oaks were exhibited and described. Mr. Kinney spoke of the importance of preserving our forests from the ravages of fire, from the woodmans' axe, and from the spoiliation of the sheep-herder, as forests conserve the rainfall and minimize the disastrous effects of floods and drouths.

Upon introducing Dr. John Uri Lloyd, President of the Eclectic Medical Institute of Cincinnati, and author of several scientific works, Mr. Knight exhibited the monster tooth of a gigantic animal recently exhumed from a bed of gravel near the County Hospital in this city, and said that Prof. Lloyd would take it for a text and speak of the mastodon bones found near his boyhood home in the salt licks of Kentucky. Indulging in a philosophical vein of thought, the professor said that Kentucky is the great mid-land region of the country. Into its rich valleys came the mastodons and mammoths of pre-glacial ages, the buffaloes, elks, deer and other herbivorous animals of modern times, and it became the rich hunting-ground, first of the North American Indian tribes, then of the white races which focalized there from the east, from the north, and from the west and south, to secure its abundant wild game. There are still vestiges of buffalo roads fifty feet in width, tramped by innumerable herds. While the Indians roamed those primeval forests to replenish their winter stores of meat, they established their homes north of the Ohio river or south of the Tennessee. The size of the animals of the tertiary and quarternary ages which fed in these rich valleys is almost beyond belief. The ribs of some of them had been used for tent-poles by some of the early settlers in that region. The best skeleton of a mastodon in existence, 35 feet in length, was dug up there and sent to England.

Why were the bones of these huge animals found in that region? Because great springs of salt water issue from the earth, overflowing the adjacent ground, and making an immense salt marsh of a depth so great that it has not yet been probed to the bottom. Into this yielding soil the gigantic beasts who came to lick its saline incrustations, ventured too far, and sunk and were buried alive, and their monster bones are the playthings of wondering children, and the curios of zoological cabinets today.

Dr. Theodore C. Comstock, the president-elect, was then introduced by Mr. Knight as a gentleman of high scientific attainments, of wide experience in geological research, having conducted U. S. exploration parties in the field, and has been a successful educator in both eastern and western institutions.

Prof. Comstock took for his theme "The Mission of the Local Academy of Sciences," and began by giving a synopsis of the history and work of the American Association, and suggested that our local body had reached a numerical strength and stage of development to be permanently organized on a basis for doing the best work, and for affiliating with other similarly organized scientific bodies.

An abstract of Dr. Comstock's address will appear in Bulletin No. 8.

Mr. B. R. Baumgardt gave a spirited recitation—Mrs. Stetson's "The Rock and the Sea," followed by paragraphs from Tyndalls' address before the British Association at Belfast, 28 years ago.

The addresses were interspersed with excellent music, the following selections being finely rendered: Piano solo, Schubert-Liszt, by Miss Mary L. O'Donoghue; vocal solo, by Mrs. Beatrice Hubbell Plummer; violin solo, Vieuxtemps, by Miss Laura Mabel Johnson.

Wm. H. Knight.

(N.B.—The Secretary was occupied with duties incidental to the reception. At his request, therefore, the above minutes were compiled by Mr. Knight.)

BOTANICAL SECTION.

At the regular meeting Messrs. Johnston and Braunton showed spec mens of Gillias. Dr. Davidson distributed specimens of *Ammania coccinea Nasturtium curvisiliqua, and Spergularia gracilis*, from Bixby Slough. The secretary distributed a fungus collected at Hueneme by Mr. Theo. Payne which he had forwarded to Mr. Lloyd who replied as follows: "The plant is *Batterea Digueti* described in the Journal de Botanique some three or four years ago from specimens from California. It is in my opinion the same plant that was re-described last summer under the name *Batterea laciniata*. It is needless to say that as I have never had specimens of this plant previously I am more than grateful for them."

The members reported the following plaees visited since the last regular meeting, viz: Rubio, Millards, Santa Monica Canyons, Cienega and Ballona.

Specimens of Mycenastrum spinulosum and Morchella conica have been received from Mr. Payne.

BOARD OF DIRECTORS.

Los Angeles, California, May 10, 1902.

A meeting of the Board of Directors was held this evening at 940 Figueroa street. President Comstock occupied the chair.

The following applications for membership were acted upon favorably:

E. Bennet Adams.	W. J. Schaefle.	Prof. F. P. Brackett,
R. H. Behrens.	D. L. Durand.	James R. Rogers, Ph. D.
H. A. Behrens.	Mark R. Lamb.	Samuel S. Partello, M.D.
Wm. J. Canfield.	Alfred Fellows, M.D	

A committee of two, consisting of the President and Secretary, was appointed to procure a suitable hall for the meetings of the Academy and its Sections for the ensuing year.

There being no further business the meeting stood adojurned.

B. R. Baumgardt, Secretary.

BOARD OF DIRECTORS.

Los Angeles, California, June 14, 1902.

A meeting of the Board of Directors was held this afternoon, President Comstock in the chair.

The minutes of the meeting held June 10 were read and approved.

The report of the "Committee on Publication of Mr. A. L. Bancroft's Paper on Modernized English" was received.

The following Resolution was introduced and carried:

"That it is the sense of this Board that it is inexpedient at the present time to proceed with the publication of Mr. Bancroft's paper on 'Modernized English from the Standpoint of Its Usefulness,' or to form a Section within the Academy to be devoted to Philological Subjects."

Mr. Tabor called the Board's attention to the fact that the Academy was not yet incorporated, and made a motion that a committee of three

be appointed to draft the Articles of Incorporation and then report to the Board of Directors. Carried.

The following Committee on Incorporation was appointed: Comstock, Knight and Davidson.

Those present were: Comstock, Knight, Davidson, Parsons, Tabor, Whiting, Dozier and Baumgardt.

Adjourned. B. R. BAUMGARDT, Secretary.

Notes.

The County Supervisors report that 10,000 acres in the neighborhood that have been infested by the Russian thistle have been so vigorously attacked that it is estimated that this plague will be stamped out in a year from now. We may be allowed to doubt the probability of any political body ever rooting out any pest in this county or any other. We called attention to this pest in our county in 1892. Shortly afterwards there was a spasmodic attempt to spend some money in the so called extermination of the thistle. A few years after 200 acres were reported to be affected near Redondo. This ground was gone over and subsequently reported clean. A few years have passed and now 10,000 acres are infested. When this pest was first discovered $100 judiciously expended might have saved the country; now there is no limit to the money that may have to be spent to save the farmer.

Prof. Elwood Mead and Prof. J. M. Wilson, of the University of California, and Prof. Stout of the University of Nebraska, have gone to Fresno to investigate the alkali lands, with a view to improving the condition of the soil. They will spend a portion of the $15,000, which was appropriated by Congress upon the recommendation of President Benjamin Ide Wheeler and Prof. Eugene Hilgard of the State University.

The professors will endeavor to find a feasible system whereby the land may be reclaimed from alkali deposits.

The Academy of Sciences meetings will adjourn during the vacation season and will resume in September. The section meetings, with the exception of the Botanical, will adjourn until that date. The botanical section will meet as usual on the fourth Monday of each month.

Prof. Dudley of Stanford, while botanizing in the mountains east of Visalia, was bitten on the ankle, by a rattlesnake. The latest reports of his condition are very favorable.

ASTRONOMICAL NOTES.

BY MR. WM. H. KNIGHT.

Sir Norman Lockyer has advanced the opinion that a careful examination of earthquake and volcano records will disclose a connection between those phenomena and sun-spot minimums and maximums. He cites the minimum of 1867 when Mauna Loa was active; the maximum of 1872 when the West Indies were violently disturbed; and the maximum of 1883 when the explosion of Krakatoa occurred. "At Tokio, in a country where the most perfect seismological observatories exist, it is notable that at periods near both sun-spot maximum and minimum the greatest number of disturbances have been recorded."

Richard Conrad Schiedt, Ph. D., professor of natural science at Franklin and Marshall College, announces in the Philadelphia Times a new theory of terrestrial construction and evolution. He thinks there

is a solid concentric sphere of a thickness which can be mathematically computed, enclosing a hollow interior filled with gass of an enormously high temperature, and under great pressure. Volcanic eruptions are occasional successful attempts of this interior to escape. These are generally in the neighborhood of deep sea bottoms where the concentric sphere is thinnest and consequently weakest.

"The sky," says a writer in the New York Times, "is a vast immovable dial plate. The moon moves along the illuminating figures, traveling the dial quickly, like a second hand, once a month. The sun, like a minute hand, goes over the dial once a year. Various planets stand for hour hands, moving over the dial in various periods, reaching up to 164 years for Neptune. The earth like an exploration ship, sails the infinite azure , bearing the observers to different points where they may investigate the infinite problems of the mighty machinery."

Prof. Henry A. Ward, formerly of Ward's Natural Science establishment in Rochester, visited Mexico recently for the purpose of examining "the largest meteorite in the world." It lies embedded in the erath 350 miles northwest of Mexico City. It is of almost solid iron, its outer surface pitted and scarred. The object measures 13 feet in length, 6 feet in heighth, and 5 feet 4 inches in width, and its weight is estimated at 50 tons.

Prof. G. W. Meyers, acording to a recent statement of Prof. Larkin, has determined certain elements in the very interesting spectroscopic binary Beta Lyrae. Period of revolution around mass center, 13 days; distance between centers of suns, 30,000,000 miles; mass of large sun, 18 times that of our sun; mass of small sun 9 times that of our sun; velocity of small sun, 110 miles per second.

Uranus is now in opposition, and the rare opportunity to see it distinctly with the naked eye is presented to amateur observers. An opera glass tourned upon the star Theta in the right foot of Ophiuchus will include the planet in the field. Its brightness is between the fifth and sixth magnitude.

GEOLOGICAL NOTES.

By Dr. Theo. B. Comstock.

Since the last issue of the Bulletin, Professor Oscar H. Hershey has published* additional notes of studies of the Quaternary of Southern California, in which he develops interesting features of the region between the San Gabriel and Tehachapi ranges, farther east than the area of his previous work in that district. He announces a local patch of Pliocene strata (Mellenia and Escondido beds) at an altitude of 1700 feet, and deduces from his work the existence of a Pliocene river valley in the general course of the present Santa Clara river, coming from the region of Antelope Valley. This is consistent with observations by others, including the writer, and tallies well with the investigations of Professor Davidson, formerly of the U S. Coast Survey (now at head of the Department of Geography, University of California), whose researches prior to the year 1900 determined the position off-coast of twenty-one submerged channels bet ween Cape Mendocino and San Diego § Two of these lie adjacent to the Santa Barbara Channel and Dr. Joseph LeConte announced more than ten years ago that "the hollowing out of the submarine channels was the work of the Pliocene

* *American Geologist,* June, 1902, Vol. XXX.

§ *Submerged Valleys of California, etc.* Proc. Cal. Acad. Sci., San Francisco, 3d Ser., Geology, Vol. I No. 2, pp. 73-103, 1897, 9 Pl.

alone," and it was at this period that the principal islands of Southern California were brought above sea.

Professor Ritter, of the San Pedro Marine Biological Station, has recently contributed an interesting article to *Science* on the work of that well conducted institution, in which he refers to one of these submerged valleys, possibly a part of the former course of the Los Angeles river or the San Gabriel river. The fact of the existence of these old channels is well known to geologists and Professor Davidson's valued contributions to the subject are held in high esteem. As LeConte sagely remarked in the paper quoted above:† " It is impossible to conceive a more inviting field for the study of the higher problems of geology than is afforded by the phenomena of the river-beds of California."

We have here in Los Angeles a beautiful piece of river carving, as exhibited in the gorges of the Los Angeles River and Arroyo Seco. Fine sections and very instructive erosion etchings are also afforded by the cañons reaching the sea through the Santa Monica Mountains, from Port Los Angeles westward to Point Duma. These are particularly mentioned because they elucidate paragraphs in the later chapters of the geologic volume.‡

It is to the interest, and an important part of the duty, of our Academy of Sciences to enlist young people in the study of these phenomena. Let us organize field work in the Geological Section as early as possible in the autumn, and, meanwhile, consider it your individual work to gather earnest students into this organization. From Archæan to Recent, the whole record is within easy travel of this city and, actually, we ourselves are the very most ignorant of the meaning of it all.

Messrs. Delos and Ralph Arnold have published (Feb.–March, 1902) in the Journal of Geology some of the results of their work on "The Marine Pliocene and Pleistocene Stratigraphy of the coast of Southern California."

Professor R. E. Dodge presented a timely paper on "Arroyo Formation" before a late meeting of the N. Y. Academy of Sciences, in which he gives a caution against too explicit reliance on a single factor in interpreting the rate of erosion or deposition in arid regions. It is peculiarly difficult to correlate separated deposits and to assign time-values in our Pleistocene terraces and silted channels. Generalizations not based on very exact data or cumulative evidence are untrustworthy and can only be adopted tentatively.

The recent discovery of the remains of extinct Mammals in Quaternary deposits in the city of Los Angeles makes probable the unearthing of others which may have great value in settling points of local geology. It often happens, as in this particular case, that the bones, tusks and other parts are soft or crumbling. It is possible to handle these in such manner as to prevent their loss and to preserve them intact, if the aid of some one familiar with the work is secured in time. In all such cases, before the workmen are permitted to disentomb the relics, word should be sent to the President of the Southern California Academy of Sciences, office 534 Stimson Building, who will be ready to superintend the excavation in the interest of Science. Public spirited owners of such specimens will donate them to the Academy for preservation; but, at any rate, give us a chance to make observations and to ensure the relics against irreparable damage.

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† *Tertiary and Post-Tertiary Changes of the Atlantic and Pacific Coasts.* Bull. Geol. Soc. Amer., Vol. 2, p. 323-328, March, 1891.

‡Under date of June 24th, 1902, Professor Davidson writes me that there have been "noted on recent charts two or more such valleys on the West coast of South America."

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PLATE IV

VOLCANIC BLUFFS, SANTA ROSA ISLAND

PLATE V

BLUFFS ON NORTH-EASTERLY SHORE OF SANTA ROSA ISLAND
Showing Stratification of Volcanic Ash

CUYLER'S HARBOR, SAN MIGUEL ISLAND
The Place where Man's Written History of California was Commenced

NORTH BLOOMFIELD MINE, NEVADA COUNTY.

Piping. Four streams, with aggregate discharge of two thousand five hundred miner's inches.

BULLETIN
OF THE
Southern California Academy of Sciences

VOL. I LOS ANGELES, CAL., AUGUST 1, 1902. NO. 8

231 West First Street.

PREHISTORIC CALIFORNIA.

(Continued from July BULLETIN)

BY DR. LORENZO GORDIN YATES.

This was followed by a period of excessive precipitation of rain, when rushing torrents of water cut deep chasms where mountains had formerly separated the river channels, and filling up the valleys, thus made more marked alterations in the topography, bringing down immense quantities of detritus, destroying large forests of timber and scattering the remains of the huge animals which had inhabited them, carrying away much of the deposits of soil which had accumulated during a period of comparative inaction of the elements, and leaving the surface of the earth nearly in the condition in which we find it today.

It has been shown that there have been several well marked revolutionary epochs which affected large areas of the earth's crust, and also (especially since the Miocene period) large numbers of changes which have been restricted to small areas, and caused local (orogenic) displacements.

These local changes in the physiography of the region occurred at different, but not widely separated epochs of time; they were gradual in their development and are still going on, as may be shown by the gradual elevation, or depression, at various points along our present coast.

That portion of California lying south of the Golden Gate seems to exhibit the greater number of these local displacements.

In some instances are shown upthrusts of the older (sometimes granitic) rocks; this changed the water courses, and new ones were formed; or, the uplift closed the exits of large bodies of water lying in the interior depressions, forcing them to find, or cut, new outlets.

Professor Lawson says that, during the Pliocene numerous peaks and ridges rose above the general level. Numerous islands, large and small, fringed the coast of California. There were numerous submerged valleys, so that the Coast was well supplied with harbors. In a word, the coast of California at the close of the Pliocene had the aspect of an archipelago. The archipelagic condition endured into the early Pleistocene, and from this condition it has been gradually recovering up to the present day."

(Andrew C. Lawson, in Bulletin of the Department of Geology, University of California, Vol. I., No. 4, p. 158.)

Professor Lawson also notes the presence of pliocene deposits of one mile in thickness, lying south from San Francisco.

The evidences of physiographical changes near the shore line are abundant and well marked.

The question of how and when the benches or shore terraces were formed has caused much discussion among geologists, among whom they are generally considered as water-formed deposits, and entirely the result of changes in sea level.

Professor George Davidson, for many years the able Superintendent of the United States Coast and Geodetic Surveys, who had unrivalled opportunities for the detailed study of our coast line, is of the opinon that the terraces resulted from the action of ice sheets, or an ice belt contiguous to the continental shores, which he claims skirted our shore, and by its continuous movement planed down the irregularities of up-tilted and contorted surfaces of rock of varied character. He says "That some few of the smaller ones which are composed of gravel, etc., were made by the action of water, and may mark ancient sea levels, may be admitted; but those that exhibit on an extended scale level plateaus of rock, which have every degree of inclination, and an infinite variety of texture, cannot have been so wrought. *See Plate I.*

Other forces more powerful and more uniform and constant in action than water, shaped these flat-topped rocky benches or plateaus."

An examination of some of these plateaus will show that the later deposits of gravel, sand, silt, etc., lie unconformably on a surface of rock which appears to have been absolutely planed off and the different degrees of hardness of the stratification have no apparent influence upon the mechanical forces at work."

It is probable that both of these theories are correct, in part, and that in some localities, at least, the ice planed down the first or oldest plateau, upon which were subsequently deposited the more recent formations, which, by the elevations of different epochs, formed the raised sea beaches or plateaus.

The islands forming the southerly boundary of the Santa Barbara Channel, present many interesting features illustrative of the changes in the topography or physiography of the region.

These islands were formed either by an overflow of lava from some crater on the mainland, the locality of which is unknown, or, by the opening of a fissure by the pressure of molten lava beneath the surface, which released it and allowed it to flow out and fill up the valleys and other depressions on the surface.

Of these two theories the latter seems to be the most plausible.

The earlier flows of lava were, after cooling, broken up into

angular fragments by the later intrusion of molten lava from below, which enveloped the fragments of the earlier lava, forming a volcanic breccia, in which the later or cementing material, is softer and more readily disintegrated when exposed to the elements, and allows the included fragments of the earlier flow to weather out and become separated from the mass. (*See Plate 2*).

Either the shrinkage of the mass, or the irregularity of the elevation and depression of the region caused the lava to crack across the stream (the line of least resistance) and these cracks or fissures allowed the elements to act more readily upon the lines of the fissures, until openings were formed which resulted in the breaks separating the different islands. (*See Plate 3*).

Soft places in the lava rock have allowed the waters of the ocean to form the numerous caves, ocean-floored caverns, columns, arches and fantastic outlying rocks, for which the islands are noted.

Professor Lawson (*loc. cit.*) in describing the rocks of San Clemente Island, says: "On the cliffs and stream cañons of this side of the island, there are numerous caves and cavernous recesses. These appear to be an original characteristic of the lava flows, and are only *exposed, not formed,* by erosive agencies."

An extensive study of the islands lying west of the San Clemente, including the Anacapas, Santa Cruz, Santa Rosa, and San Miguel, have convinced me that, however well his theory may fit to San Clemente, it will not apply to any of the other islands I have mentioned; for where so many miles of perpendicular volcanic bluffs are exposed there would, on this theory, certainly be many of these caves visible above the ocean level, whereas of the large number of caves visited by me, I know of two only which, in ordinary times, have any portion of their floors exposed above the ocean level, and one of those is covered at high tide, and the other is dry by reason of its lying back of a mass of rocks which have fallen from the bluff.

The beating of the waves has worn these caves and tunnels into the vesicular basalt, carving out chambers whose roofs are supported by grand pillars; or into low, cavernous, arched tunnels which extend to unknown distances under the island. In some instances the openings are high, gradually decreasing in height until the roof becomes so low that the crests of the waves touch the roof and fill the caves, the confined air causing reverberations similar to the discharge of artillery.

In time, some of these caves or tunnels are cut through the islands, in the narrowest places, and later the roof falls and the island is divided.

After the roof has fallen, the passages wear away more rapidly, and form passages of widths varying from a few yards to three or four miles in width, as may be seen in the channels which separate the various islands from each other.

The channel between Santa Rosa and San Miguel; Santa Rosa and Santa Cruz; Santa Cruz and the Anacapas are from three to four miles in width, while the passages which separate the three Anacapas from each other are, in one, less than a quarter of a mile, the other only sufficiently wide to permit the passage of a row boat.

This manner of division of the islands is plainly shown at the eastern end of the Anacapas, where an individual arch is left standing at some little distance from the extremity of the Eastern Island, and between it and the island a column which formerly supported two other arches which connected the present arch with the island.

After the lava flow the islands were submerged and an extensive series of strata of sand, gravel and silt were deposited, of which the greater portion have since been eroded.

Some of these strata contain well-preserved fossil shells, and on Santa Rosa Island bones and teeth of the Fossil Elephant have been found by the writer and others, showing the connection of the island with the mainland during recent geologic periods.

In the southern portion of San Diego County there are fossil shells of species now found living in the Gulf of Lower California, showing that the region was, until recently, covered by the waters of the Gulf.

And now, having endeavored to out line the condition of our State in prehistoric times, the next chapter will be devoted to the animals and plants of the same period of the earth's history.

(To be Continued).

Plate 6 represents a view from the southwesterly side of Cuyler's Harbor, San Miguel Island. In this harbor Cabrillo, the Portuguese navigator in the service of Spain, who discovered the islands, wintered in 1542-43, and it is where he is said to have been buried.

The dark portions seen on the northerly shore of the harbor are the exposed portions of the volcanic rock, over which the sand (represented by the light-colored portion of the illustration) is driven by the prevailing northwesterly winds.

These winds are so prevalent during summer, that they are known as "the trade winds" and they are so strong that they carry the sand across the channel represented in Plate 3, to Santa Rosa Island, where a portion is deposited, to be again carried by the wind across its western end, which is shown in the illustration, and eventually into the ocean.

The sand accumulates on the top and down the face of the steep bluff, as seen in the illustration, until its weight causes it to slide down into the harbor, like a snow slide from a steep mountain side. An occurrence of this character took place several years ago which attracted widespread notice, and the results of the sudden shifting of such an accumulation was such as to wreck a sloop anchored in the harbor, casting her ashore on the opposite side.

One of the San Francisco dailies sent a special to investigate, and printed an entire page giving a highly colored account of "The Great Earthquake on San Miguel Island."

PLATE VIII

CALOCHORTUS STRIATUS, PARISH.

The Southern California Species of Calochortus.

BY S. B. PARISH.

This paper was prepared before the appearance of Mr. Carl Purdy's recent "Revision of the Genus Calochortus," [1] but by the delay in its publication I have been able to revise it with the aid of his helpful treatment. Mr. Purdy has favored me also with some valuable manuscript notes.

Mr. Purdy's monograph is the first attempt, since that of Dr. Sereno Watson, [2] at presenting a systematic treatment of those species of Calochortus which grow in the United States. His acquaintance with these plants, both in their native haunts and under cultivation, exceeds that of any other botanist, so that his views respecting them are entitled to great deference. It is, therefore, with no little hesitancy that I am obliged to dissent from his disposition of some of the Southern California species, especially as my field acquaintance is confined, for the most part, to the few species which occupy this little corner of the vast region inhabited by the genus.

At the outset of any attempt to establish lines of specific separation in the genus, we are met by the necessity of relying largely upon color and color-markings, characters unstable at best, and unsatisfactory, and seldom more so than in the present case. Colorations the most distinct, and apparently fixed are found to fade away at times in infinite variations. Elsewhere I have directed attention to this evanescence in the brilliant and distinct markings of *C. venustus*, [3] markings which in one locality may be repeated in thousand of flowers with substantial sameness, while in another they may be confused, or disappear, so that extreme forms are referable to the species only from habital propinquity.

Great diagnostic importance must be assigned, also, to the character of the petaline glands, their shape and indument; yet

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1 CARL PURDY. A revision of the Genus Calochortus. Proc. Cal. Acad. Ser. III, Bot. 2:107-156. t. 15-19. Dec. 1901.

2 SERENO WATSON. Revision of the North American Liliaceae. Proc. Am. Acad. 14:213-288. July, 1879.

3 S. B. PARISH. Variations of Calochortus venustus, Benth. Zoe, 3:352.

in some cases these glands are subject to variation, or even may become obsolete. The size of the flower in individuals of the same species often varies greatly, but the proportional dimensions of the petal, and the relative lengths of petals and sepals, are commonly, but not invariably, preserved. The character of the tips of the sepals, as to remaining erect, or becoming more or less recurved, or even coiled, has been relied upon, but appears of slight value. The color and shape of the anther, and to some extent the proportionate length of the filamant in respect to it, are of value in the discrimination of some species.

In the grouping of the Southern California species, at least, the most reliable character appears to be the presence or absence of hairs on the inner surface of the petals, their nature, and the area occupied by them when present.

The corms of Calochortus are usually solitary, rarely two or three, or even several, together, and each corm produces a single stem, or sometimes two or three stems. They grow at a depth of six inches or more, commonly in dry gravelly or stony soil, and usually in the protection of shrubs. This is not however an invariable habit; *C. invenustus* sometime grows in wet meadows, *C. Kennedyi* frequently in hard clay, and *C. striatus* is found in soil strongly alkaline. The flowers in Eucalochortus are generally produced in a sort of few-flowered umbel, the branches subtended by reduced leaves, or bracts. The basal leaves, one or more in number, are long, narrow and grasslike.

In the accompanying table the local distribution of the various species, both regional and altitudinal, is shown. The region between the Sierra Nevada range and the sea has been designated, for lack of a better name, as the Intramontane Region, since it is composed oreographically of valleys lying between mountain ridges. It contains two well marked subregions; the Costal, extending 25-30 miles from the ocean, and usually not exceeding 500 feet in altitude; and the Interior, the remaining portion, including the foothills, and heaving an altitude of 1,000 to 4,000 feet. The islands off the coast may be separated advantageously as a third subregion. The Nevadan Region is practically delimited by the pine belt of the Sierra. The Mojave subregion of the Desert only is given, as no species of Calochortus are known from the Colorado desert.

The dagger (†) indicates that the species is common; the minus (–)sign that it is rare; and the asterisk (*) that it is local.

DISTRIBUTION OF THE SPECIES OF CALOCHORTUS IN SOUTHERN CALIFORNIA.

	REGIONAL					ALTITUDINAL								
	Intra-montane													
	Insular	Costal	Interior	Mojavan	Nevadan	500 feet	1000 feet	2000 feet	3000 feet	4000 feet	5000 feet	6000 feet	7000 feet	9000 feet
C. albus		†	*			–	†	†	–					
C. Catalinæ	†	*				*								
C. Weedii		†	–			†	†	–	–					
C. Plummeræ			†				†	†	†	–	–			
C. clavatus		*				*								
C. concolor		†	–				†	–	*					
C. splendens			†				†	†	†	†	*			
C. striatus				*				*						
C. Palmeri				*					*					
C. invenustus					†						–	†	†	*
C. Dunnii			*							*				
C. Kennedyi				†					†	†	–	–	*	
C. venustus			*					*	*					

KEY TO THE SOUTHERN CALIFORNIAN SPECIES OF CALOCHORTUS.

Flowers subglobose, nodding — 1. C. albus
Flowers open campanulate, erect
  Capsule oblong, obtuse — 2. C. Catalinæ
  Capsule attenuate upward, or beaked
    Petals densely hairy on the lower half of the inner surface
      Petals more or less ciliate at summit, yellow — 3. C. Weedii
      Petals not ciliate, purple
        Hairs slender — 4. C. Plummeræ
        Hairs clavate — 5. C. clavatus
    Petals with scattering hairs on the lower half
      Petals not striate
        Petals and anthers yellow — 6. C. concolor
        Petals lilac, anthers purple — 7. C. splendens
      Petals striate, light purple — 8. C. striatus
    Petals nude, except at or near the gland
      Petals never oculate
        Stems bulbiferous at base

Gland large, ill-defined; claw brown	9.	C. Palmeri
Gland small, circular or oblong		
Petals greenish-white, claw purple	11.	C. invenustus
Petals clear purple, claw yellow	12.	C. invenustus montanus
Stems not bulbiferous at base		
Petals white	10.	C. Dunnii
Petals vermilion	13.	C. Kennedyi
Petals normally oculate		
Petals white, or pale lilac	14.	C. venustus
Petals deep lilac, or purple	15	C. venustus purpurascens
Petals light yellow	16.	C. venustus sulphureus

DESCRIPTION OF SPECIES.

§ EUCALOCHORTUS—*Petals arched and broadly pitted, the gland transversely crested; capsule broadly elliptical, deeply triquetrous, the thin compressed lobes acute or winged, septicidal; seeds ascending, the testa close and pitted, mostly brownish.*

Flowers subglobose, nodding.

CALOCHORTUS ALBUS, Doug. ex. Benth. in Maund & Heuse, Bot. 98. Watson, Proc. Am. Acad. 14:262. Purdy, Proc. Cal. Acad. Ser. 3, Bot. 2:117.

Glaucous; stems 15-45 cm. high, mostly branching; bracts foliaceous, lanceolate-acuminate; sepals shorter than the petals, greenish; petals white, ovate-orbicular 15-25 mm. long, bearded above the gland with long white hairs; gland lunate, shallow, with four transverse upwardly-imbricated scales, fringed with short glandular hairs; anthers oblong, obtuse, mucronate; capsule 2-5 cm. long, 1-2 cm. wide; seeds pitted.

Open, wooded slopes, from near Julian to Los Angeles and Pasadena. North to Butte county, according to Purdy, and to Ukiah, according to Jepson.

§ MARIPOSA—*Flowers open-campanulate; gland usually densely hairy; sepals often spotted within; seeds with minutely pitted white testa; pedicels stout, erect.*

* *Capsule oblong, obtuse at both ends, winged; testa close.*

CALOCHORTUS CATALINÆ, Watson, Proc. Am. Acad. 14:268. Davidson, Erythea 2:2. Purdy, l. c. 145. *C. Lyoni*, Watson, l. c. 21:455.

Stems 3-6 dm. high, bulbiferous at base; leaves and bracts linear; sepals ovate-lanceolate, purple spotted near the base, nearly equaling the petals; petals cuneate-obovate, 3-5 cm. high, light to darker lilac, with a large ovate purplish blotch at base; gland oblong, yellow or brown, covered with brown or yellowish hairs; anthers obtuse, light pink, 5 mm. long, on filaments thrice their length; capsule 2.5-5 cm. long, about 1 cm. wide.

Near the coast on lower hills, from Los Angeles, where it is abundant, to Santa Barbara, and on the adjacent islands. Mr. Purdyis in error in reporting it from as far inland as San Bernardino. It is strictly a coast species. The type was collected on Catalina Island, in June, 1878, by Paul Schumacher.

** *Capsule narrowly oblong, with thick obtusely angled lobes, attenuate into a beak; testa loose, spongy.*

† *Petals densely hairy within on the lower half.*

Calochortus Weedii, Wood, Proc. Phila. Acad. 1868, 169. Watson, l. c. 264. Purdy, l. c. 132.

Stems 3-5 dm. high, not bulbiferous at base; bracts linear; sepals oblong with an acuminate tip, nearly as long as the petals, or exceeding them, yellow, orange spotted at base; petals cunate-obovate, sometimes truncated, 2.5-3.5 cm. long, deep yellow, usually brown-dotted, the upper margin ciliate, densely clothed with yellow hairs at least on the lower half; gland small, circular to oblong, densely hairy; anthers oblong, acute, longer (1 cm.) than the slender filaments; capsule 4 cm. long.

Dry hills in the coast mountains of San Diego county. The type was collected at "San Diego". This seems to be one of the most constant species in coloration, but varies somewhat in the relative length of sepals and petals.

(To be Continued),

Notes on Sphaeralcea and Malvastrum.

BY T. D. A. COCKERELL.

I notice on p. 74 some observations on *Sphæralcea fendleri Californica*, Parish. The original description of this form (*Zoe*, Sept.-Oct., 1900) is not very detailed, but I strongly suspect that it is the *Sphæralcea variabilis*, Cockerell, *Amer. Nat.* April 1900, p. 291—the common plant of Salt River Valley, Arizona. This seems the more likely, because it has been found in California only here and there, as if accidentally introduced. At the end

of March of the present year I had a fresh opportunity of studying *S. variabilis* in Salt River Valley. It certainly deserves its name, for almost every plant seems to have marked peculiarities. Here are some notes I made in the field :

(1.) TEMPE, Ariz. The style-branches and stigmas deep crimson; anthers grey, pollen olive-green. The flowers seem not to open so wide as *S. fendleri*.

(2.) PHOENIX, Ariz. Flowers paler than in the Tempe plant just described; styles and stigmas pale purplish-pink; anthers and pollen yellow. Leaves greyish, tripartite, the lateral lobes separated down to the base; median lobes about 45 mm. long and 22 broad; lateral lobes about 22 mm. long and 19 broad; all coarsely crenate. Green fruit shows no signs of cusps; it is maliform, densely stellate-pubescent; sides of carpels reticulate. This may stand as form *triphylla;* it is parallel with *S. incana* form *dissecta* (var. *dissecta*, Gray, Pl. Wright, i. 21).

(3.) PHOENIX, Ariz. Styles and stigmas whitish, with a faint purplish tint: anthers with deep purple lobes; pollen pale yellow; petals short, long. 11, lat. 10 mm., vermillion; leaves long and narrow, wavy-margined, with basal lobes; fruit about as in f. *triphylla*.

(4.) PHOENIX, Ariz. Styles and stigmas deep crimson; anthers dark crimson, becoming black at maturity; pollen yellow; flowers bright vermillion; petals long. 15, lat. 13 mm.; leaves fairly broad, tri-lobed.

Growing mixed with the *S. variabilis*, both at Tempe and Phoenix, I found *Malvastrum Coulteri*, Watson, with deep orange flowers--an exquisitely beautiful plant. This has been referred to *Sphæralcea*, but it has the fruit of a *Malvastrum*, and belongs there if there is any validity in the characters used to separate these genera.

There is no doubt that *S. variabilis* is closely related to *S. fendleri*, and perhaps it should stand as a subspecies of it. Then the *fendleri* series will be classified thus:—

(1.) *Sphæralcea fendleri*, Gray. This is the form with deeply lobed rather short leaves; I have a tracing of the type, kindly sent by Dr. B. L. Robinson. The flowers are bright red in life, not "rose-red". The plant is common in New Mexico, from Las Vegas and Santa Fe to the Mesilla Valley.

(2.) *Sphæralcea fendleri* f. *lobata* (*S. lobata*, Wooton, Bull. Torr. Bot. Club, xxv. 306). This differs in the form of the leaves, which are longer and larger; it is really commoner than true *fendleri*, with which it completely intergrades. Professor Wooton informed me, however, that the *S.*

fendleri of the White Mountains, New Mexico, was apparently well differentiated from *lobata*. Perhaps this is a subspecies not hitherto recognized, and not the true *fendleri*, which is surely the plant of the region about Santa Fe, etc.

(3.) *Sphæralcea fendleri perpallida* (*S. lobata perpallida*, Ckll., Bull. Tarr. Bot. Club, xxvii. 88). Rincon, N. M., may be considered the type locality; the plant occurs from there northward as a well-segregated race, apparently not mixed with the type. The leaves are rather narrow and deeply lobed, but very variable.

(4.) *Sphæralcea fendleri variabilis* (*S. variabilis*, Ckll., Amer. Nat., 1900, p. 291), with f. *triphylla*, described above.

S. cuspidata, (Gray) Britton, has been confused with the *fendleri* series, but is entirely distinct. The first spring leaves of *cuspidata* are long and narrow; those of *fendleri* always very broad.

Our common *Malvastrum* at Las Vegas, N. M., is *M. dissectum*, (Nutt.) Ckll., Dr. P. A. Rydberg writes me that he thinks this is the veritable *M. coccineum* (Pursh) Gray; but it seems to me doubtful whether Pursh's plant can be certainly identified, or proved to be different from that of Nuttall. It would probably cause least confusion to drop the name *coccineum*, and call the plant I referred to *coccineum* in Bull. Torr. Bot. Club, xxvii. 88 by the name *Malvastrum elatum* (*M. coccineum* var. *elatum*, E. G. Baker, Journ. Bot. xxix. 171). Mr. Baker kindly sent me a tracing of the leaves of his plant, so I feel assured of its identity, though his actual type was doubtless more robust than usual.

Marine Biological Station, San Pedro, Cal.

The second session of the "Marine Biological Station" of the University of California at San Pedro, opened June 26.

The laboratory occupies the same quarters as last year, consisting of a large general laboratory with lockers, store-room and aquaria, and also a number of smaller rooms for private work. This, together with microscopes, reagents, apparatus, and reference books from the department of Zoology of the University make a good working equipment.

As announced in the circular of information, the object of the station is mainly research. All the students have had preliminary training and are doing advanced work, individually instead of in class, under the direction of Dr. C. A. Kofoid and Dr. H. B. Torrey. Each student is given a special independent problem or line of work, and general zoology comes in incident-

ally. The following lines of investigation and study will indicate the scope and importance of the work going on.

Habits of the Enteropneusts (one species being very abundant at San Pedro), by Professor W. E. Ritter, head of department of Zoology of University of California.

Parasite Protozoa, by Dr. C. A. Kofoid, department of Zoology of University of California.

Regeneration of Corymorpha and other Coelenterates, by Dr. H. B. Torrey, department of Zoology, University of California.

Food of Harenactis (a sand anemone) and comparison of some San Pedro Holothurians with related species of Hawaii, by Mr. Loye Miller, Professor of Zoology, Oahn College, Honolulu, Hawaii.

Nervous System and Life History of the San Pedro Enteropneusts and growth and regeneration of Alcynaria and other colonial Coelenterates, Mr. B. M. Davis, department of Biology, State Normal, Los Angeles.

Study of heart beat of the Ascidian (Cione), Mr. Easterly, graduate student, University of California.

Embryology of Shark, by Mr. Townsend, student University of California.

A sexual development of anemones, by Mr. Forest Whitaker, Los Angeles.

General Zoology, by Miss Hannah, student of University of California; Miss Edna Watson, student, State Normal, Los Angeles, and Miss Romola Adams, Los Angeles.

Many interesting facts have already been brought to light and when published will form important contributions to Biological literature.

With the exception of a short trip for taking temperature and soundings the work of the Biological survey was not resumed. The work will probably be taken up next year.

The unqualified success of the two summers' work here has emphasized the desirability of a permanent station at San Pedro. While nothing more definite has been announced than that the work will probably go on next year, it is hoped that more substantial and permanent quarters may be secured. B. M.D.

Abstract of Address by Prest. Dr. T. B. Comstock

Delivered at the Annual Meeting of the Southern California Academy of Sciences, May 13, 1902.

No settled policy and no fruitful effort towards fraternal relations among isolated scientific societies appears to have had effect prior to 1840, when the American Association of Geologists and Naturalists was organized. Through its influence a distinct advance was made in the popularization of Natural Science, resulting, in 1847, in the formation of the American Association for the Advancement of Science. This great body now has over 3000 members, including the most prominent workers in all

branches represented in its ten sections, covering the whole field of science as it is today outlined by investigators. In 1874, it was found necessary to provide for two classes of members, and in order to ensure the preservation of the prestige and dignity of the organization as a purely scientific institution, the governing body has since been composed wholly of "Fellows," although the officers are chosen by a general committee to which non-professional members may be elected.

My thesis is that the local Academy best subserves its end when, without losing sight of the value of original research and of the duty to perform it which rests on well qualified members, it provides, in a restricted degree, much the same advantages, and secures, in minor measure, similar results to those of the American Association. Its objects are "to promote intercourse between those who are cultivating science * * * *, to give a stronger and more general impulse and more systematic direction to scientific research, and to procure for the labors of scientific men increased facilities and a wider usefulness."

A suggestion has recently been made in *Science* by Dr. Franz Boas, that the various local societies might properly be affiliated with the American Association for the Advancement of Science, as foster-children. A gravitating movement to this end may probably be recognized in the changes which have occurred in that body. But the end is not yet.

The changes in methods required to adapt our machinery wholly to such a system would not seriously disturb accepted traditions, nor could any but good results ensue. But I believe that two issues will ere long be presented to us which can only be settled properly in one way. We must develop greater interest in the sections on the part of technical members and avoid popularizing these meetings to the extent of belittling the name of science; and we must spare no pains to secure speakers for the general meetings who can popularly interpret the results of technical research. As the means to these ends, it will sometime become necessary to adopt the method of the American Association and to give over the management of the sections to a select class of Fellows. The Board of Directors, as a Council, ought, I think, to be made up by sectional representation, and other slight alterations of the Constitution might be desirable.

Strictly speaking, there is no existing association which fairly meets the requirements of a National Federation of local Academies, nor can this want be satisfied until these bodies have become adjusted to a common pattern. But it has seemed to me that the Carnegie Institution, recently established at Washington, might well undertake some missionary work in this direction.

We have, *first*, a goodly fellowship of scientists who are esteemed members of National Technical Societies or qualified for such relationship by their published work; and, *secondly*, a larger number of persons occupied with business pursuits, who are deeply interested in the results of pure research and glad to lend their aid towards the advancement of science by the maintenance of this society.

Now I realize keenly that the honor conferred upon me, highly as I esteem it at your hands, is weighted down with added responsibility arising from this complex. There can be no question that the policy of this combination is correct. And certainly there is no intention here to contravene it. But it is well for us to confront the situation fairly and to clearly ascertain what limitations and what obligations are thereby imposed.

In the first place, we cannot expect to enlist and retain professional workers unless some salutary supervision be given to prevent the use of the prestige of the Academy for selfish ends, and for the restriction of communications to topics germane to the wide enough scope of the organization. On the other hand, the support and encouragement needed

from laymen necessitate due attention to their just demands for the presentation of papers in less technical form than would be proper before learned societies.

The mission of the local Academy being, as I take it, to elucidate local Nature according to its capabilities, to conserve or record natural landmarks wherever possible, to inspire rising generations with zeal for research and to promote and promulgate the results of scientific investigations, it does not appear to be any part of its duty to undertake the performance of work within the purview of strictly technical societies.

But there is some danger of carrying this idea too far in applying it to the sections, unless due regard be had to technical accuracy as contrasted with technical pedantry.

It is at least possible that the home we sorely need will be provided in some way ere many years. This is essential to the right performance of the task before us. Already discussion relating to the arrangement of rooms has been had. Many have taken for granted that a museum, library and laboratories are required. It is my opinion that the museum should always be held as an educational feature, the books should be relegated to the custody of the public library, where they would be as accessible as elsewhere and properly cared for by experts in book-handling, and the laboratories should be instituted only as required for the purpose of carrying on work especially endowed.

Local collections, as such, are valuable in economic lines and appropriately housed in museums of applied science. But type specimens of plants, animals and fossils ought to be preserved in a central city readily accessible to students, under the care of trained specialists. An appropriate place has been provided for such material at Washington in the National Museum. Nor should we narrow the scope of exhibits to the local horizon. There is a vast difference in purpose between a Chamber of Commerce and a scientific society.

There are advantages in having a regular means of communication between the active officers of the society and its members, and no harm can ensue from the printing of papers and contributions which cannot well be circulated through more technical channels. But bulletins of this class of organizations are not good mediums for publishing results which are adapted for presentation to national technical societies. Abstracts, summaries and items of scientific news in untechnical language are appropriate always.

In the saying of this, do not imagine that I decry the high-class work of which many of our trained members (our Fellows, in fact,) are capable, and which they have freely offered in some of our sectional meetings. We may be proud, as we are, of their achievements and glad indeed to have their results explained to us, but the cause of science is not elevated by making the local general society the grave-yard for technical literature. The scientific reputation of any member is to us a source of pride and of gain, but we must not forget that our machinery is not itself adapted to make such reputation for any one, whatever facilities we may be able to afford for fostering and encouraging the work upon which it is based.

The best methods of promoting the cherished objects of our association are matters for discussion. There may be differences of opinion and I am merely outlining in the most general way, the character of platform upon which you may expect me to stand during my official term as your President. So far as my accomplishment may go, bear in mind that it will very largely depend upon your hearty approval and the cordial support of the earnest Board of Directors elected by you.

That the Southern California Academy of Sciences has attained its present high standing and efficient usefulness speaks loudly for the worth and work of the five capable men who have presided since the

organization eleven years ago. To Dr. Wm. Alter, the first President, Dr. Anstruther Davidson, W. A. Spaulding, Abbott Kinney and Wm. H. Knight, we owe a debt of gratitude for this creditable and influential institution, which has become a source of pride to every member and which you have too generously confided to my guidance at this juncture. You know how long and faithfully Mr. Knight, the retiring President, has served you in this capacity, and you may feel less keenly the transfer of his office to one imperfectly qualified, when you consider that the most important position of Secretary continues to be occupied by one who is beginning his tenth year of arduous duty in that capacity. It need hardly be stated that my hesitancy in undertaking the responsibilities now falling upon me has been overcome chiefly by the fact that the Board of Directors, as now composed, includes three out of the five Past Presidents and the most efficient Secretary, who would certainly have been President in my place had it been feasible to spare him from the great work he has performed with eminent success.

Yet, proud as we are of them and of their achievements, I know full well that they and the other working members of this society are not content to rest on the laurels already earned. We all hope to push on to even better things, according as the light of our knowledge may guide us in the years to come. And as this hour brings the present duty, what shall be our aim for the coming year? No one understands better than the presiding officer how truly must the Directors become servants of the whole membership if a successful administration is to be secured. Past success implies past service along lines approved by the members. The history of the growth of the Academy indicates this beyond question. And yet, it may well be that the old machinery is susceptible of some improvement. There are two classes of business constantly appearing in an organization like this, viz: that relating to its prestige as a scientific body, and that which concerns its business affairs. Again, there may be certain matters which relate particularly to one section, and others which affect the interests of the whole body. There are things peculiarly fitting to be carefully discussed by selected officers, and other items on which the consensus of opinion of the members is of much importance.

Perhaps the Constitution provides well enough for the adjustment of these matters, but personal observation and talks with members lead me to think that our machinery has become a trifle worn, and that some provision ought to be made for adapting it a little more to the work we undertake to perform. Your directors are earnest, capable and practical men, and they can and will conduct your affairs well and economically. But there are some things they cannot accomplish without your consent and interest and your constant co-operation.

Do not consider the meetings in the light of public lectures, but rather as gatherings for general discussion and enlightenment. Don't leave to your President the thankless task of running the machine alone, but turn in and work, each member regarding himself or herself as a standing Committee on Ways and Means. Moreover, give us the benefit of your advice and help to make it effective for good. We all seek an end which is lofty and progressive. "Come then and let us reason together," and when once we have decided upon the road to follow, uniter let us press forward towards the goal, and, above all, LET US GET THERE! I pledge you my best endeavor, the consecration of self to the cause, and I beg of you to hold up your end, and lend your helping hands.

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Important meeting of the Southern California Academy of Sciences, Monday, October 6, 1902, at eight o'clock, at the Womans' Club House, No. 940 South Figueroa Street.

To the Members, Southern California Academy of Sciences:

Herewith is enclosed a copy of the Constitution and By-Laws proposed by your Board of Directors, in the form in which it was formerly presented at the September meeting of the Academy. This will be the basis for action at the regular meeting October 6, 1902, when it is hoped that a full attendance of the members may be secured. Persons desiring to effect any changes will get their ideas before the Academy by motions made as the individual sections are read off at the meeting by the Secretary.

By resolution of the Board af Directors, passed September 30, 1902, I am instructed to inform you that they view with favor two suggestions for amendment which have been offered by Mr. C. B. Boothe, as follows:

For Article III, Section 4, of the Constitution herewith, to substitute the following: "Honorary members proposed to the Board of Directors shall be elected by them at their discretion."

In Article V, Section 2, of the Constitution, to strike out the words at close "to apply towards the expense of investigation."

These changes and others cannot now be made without a vote of the members to be present at the October meeting of the Academy, as the Directors have no power to alter the form proposed by them at the last meeting.

It is unnecessary to add that the time and place for discussion of the proposed changes are clearly indicated in this letter, and I make this personal appeal to every member to frankly express his or her opinions then and there and not by complaints when it shall be too late to be effective.

Remember, at the Womans' Club Hall, Figueroa street, near Tenth, Monday evening, October 6, 1902, exactly on the hour of 8 p m. Respectfully.

THEO. B. COMSTOCK. President.

CONSTITUTION.

ARTICLE I

NAME AND OBJECT

SECTION 1 The name of this Association shall be Southern California Academy of Sciences

SEC. 2. The objects of the Academy are

(1) To promote intercourse among those who are cultivating science; (2) to elicit public interest in the results of technical investigation by the dissemination of correct information relating thereto; (3) the study of local natural features and phenomena; (4) the conservation of material illustrating local phases

ARTICLE II

SECTION 1 The membership of the Academy shall consist of Active, Affiliated and Corresponding Members, Fellows, Patrons and Honorary Members

Honorary Members shall be chosen with life tenure, they shall be exempt from the payment of dues and shall receive the publications of the Academy, but shall not be entitled to vote or to hold office

Active Members and Fellows shall have the right to vote and hold office, subject only to the restrictions imposed by this Constitution, and they may acquire life tenure in their respective classes under the provisions of this Constitution. Patrons and Honorary Members shall be chosen with life tenure, and Corresponding Members may be elected with limited tenure or life tenure at the option of the Board of Directors

SEC. 2. Any person living in California, south of Latitude 37°, may become an Active Member of the Academy upon subscribing to this Constitution, after formal election as herein pre[scribe]d, and due compliance with the By-laws in force at the time of election

SEC. 3 All duly qualified members, in good standing, of any affiliated local society shall be enrolled as Affiliated Members of the Southern California Academy of S[ciences]

SEC 4. Corresponding Members may be elected (with limited tenure or life tenure) from duly qualified persons, non-resident in Southern California, in the same manner as provided for the election of Active Members of the Academy

SEC 5. Fellows shall be chosen from among the Active Members and Affiliated Members of the Academy, as provided in [Article] III, Section 3, of this Constitution

SEC 6. Any person contributing in any one year the sum of Five Hundred Dollars shall be classed as Patron, with all the privileges of a Life Member. Should such patron be at the time a Fellow of the Academy, the status shall become that of Life Fellow.

SEC. 7. Honorary Members may be elected from outside the membership of the Academy, in manner prescribed in Article III, Section 3, of this Constitution

SEC. 8 Life Members and Life Fellows shall be such as may commute by the payment of Fifty Dollars at one time, which payment shall exempt from all dues thereafter during life, with all privileges appertaining to the class to which the member or fellow then belongs

ARTICLE III

ELECTION OF MEMBERS

SECTION 1 Candidates for Active Membership shall be proposed by two members, in writing, and all such proposals shall be acted upon by the Board of Directors. The names of elected members shall be announced at the first regular meeting of the Academy following election

SEC. 2 Corresponding Members shall be elected by the Board of Directors. The names of those so elected shall be announced at the first regular meeting of the Academy thereafter

SEC 3. Fellows may be elected by the Board of Directors by virtue of their scientific attainments or services All such elections shall be by ballot and seven affirmative votes shall be necessary to elect. Only Active Members and Affiliated Members shall be eligible for election as Fellows *Provided, however, that ... prior to October 1, 1902, shall have the option to become Fellows, without formal election, not later than November 15, 1902, upon compliance with the other provisions of this Constitution and of the By-laws in force at the date of exercising this option.*

SEC 4. Honorary members may be elected at the annual meeting of the Academy, by unanimous vote of the members present at said meeting If the vote be not unanimous, the matter shall be at once referred to the Board of Directors for final action

ARTICLE IV.

WORKING SECTIONS

SECTION 1. There may be organized, as occasion warrants, separate working sections, corresponding in scope to individual branches of science. Each section shall elect its own officers and conduct its scientific work, *per se*, subject to the limitations of the Constitution and By-l[aws and t]he supervision of the Board of Directors. All legislati[on pa]ssed by any Section shall be inoperative until formall[y approve]d by the Board.

SEC. 2. No Section sh[all be f]ormed without petition presented at a regular meeting [of the A]cademy, signed by at least five members, of whom not le[ss than th]ree shall be Fellows. Such petition shall be read befor[e the Aca]demy and referred to the Board of Directors ...

SEC 3. Upon authori[zation] as provided in Article IV, Section 2, the President and Secretary of the Academy, as temporary officers of the proposed section, shall call a meeting of members interested and proceed to organize the section in manner following

1. Calling Meeting to order
2. Reading of Petition and Minutes relating to same.
3. Signing roll by organizing members
4. Election of Chairman and Secretary
5. Formal announcement of organization

Upon organization, the Section shall adopt a set of By-Laws in no way conflicting with the Constitution and By-Laws of the Academy, which shall thereupon be submitted to the Board of Directors for approval When so approved and attested by the President and Secretary of the Academy, the Section shall be regarded as fully established on equivalent basis with any and all other Sections of the Academy

SEC 4. All members and Fellows of the Academy shall be free to unite with any or all Sections and no Section shall admit to voting privileges any non-member of the Academy

ARTICLE V

SECTION 1. Any local scientific society within the limits prescribed in Article II, Section 2, may enter into affiliation with the Academy, upon the terms and in manner prescribed in the succeeding sections of Article V of this Constitution

SEC. 2 Application for affiliation must be made by the President and Secretary of the society, upon a blank form authorized by the Board of Directors, giving evidence that the application is made in accordance with the vote of a clear majority of the members of said society, and that the objects and purposes of the society are similar to those of the Academy Each application must be accompanied with a fee of five dollars to apply towards the expense of investigation

SEC. 3 Application for affiliation shall first be referred to the Standing Committee on Affiliation, who shall investigate and report to the Board of Directors Notice of favorable action by the Board shall be given at the first regular meeting of the Academy thereafter, and such action shall be regarded as final, unless objection be raised by at least two members, when the question shall be at the disposal of the Academy by a vote of not less than two-thirds of all the members present

SEC 4. Societies affiliated under the provisions of the three foregoing sections of this Article V, shall contribute annually in advance to the treasury of the Academy a sum equivalent to one dollar for each and every voting member of said affiliated society, whereupon that number of persons shall be enrolled as Affiliated Members of the Academy, with all the privileges of Active Members, except the right to vote and hold office. For each additional member thus enrolled, the sum of one dollar must be paid at the date of enrollment

ARTICLE VI

OFFICERS

SECTION 1. At the annual meeting of the Academy and at the annual meetings of Sections, there shall be elected a Board of eleven Directors, in manner following

The Academy shall elect three Fellows to serve as President, Vice President and Secretary of the Academy, respectively, and as many more Directors (from the Active Members or Fellows) as may be required to complete the number of eleven, after allowing one representative from each established Section of the Academy. Each Section shall then elect from among the Fellows thereof, a Chairman, who shall be the accredited representative of the Section on the Board of Directors. But, should any Chairman of a Section be already a member-elect of the Board of Directors, then the Section shall elect another representative on the Board of Directors from its own membership Provided that the eleven Directors elected by the Academy in May, 1902, shall serve until the expiration of their respective term in 1903.

SEC 2. The financial and general business transactions of the Academy shall be entrusted to the Board of Directors, who shall have the care and control of all real and personal property and shall receive, disburse and invest all funds of the Academy by drafts drawn on the Treasurer by the President and counter signed by the Secretary

SEC. 3. At the first meeting of the Board of Directors a Treasurer shall be chosen from the members of the Board, whose duty shall be to receive and disburse all funds of the Academy in accordance with the provisions of this Constitution and the instructions of the Board of Directors

ARTICLE VII

ELECTION OF OFFICERS

SECTION 1 Annual elections of officers and Directors shall be held on the date of the annual meetings of the Academy and its Sections in the month of May, by method prescribed in the By-Laws, and the administrative officers shall be installed at the annual meetings of the Academy and Sections in June following The incoming Board of Directors shall assume control immediately on the adjournment of the June meeting, and the officers-elect of Sections shall be duly installed at the June meetings of their respective Sections.

SEC. 2. Election of officers and Directors of the Academy shall be by ballot, after nominations duly made as herein provided viz:

Any person entitled to a vote may nominate, in writing, not later than March 30th, one candidate for each position to become vacant The names of all candidates so nominated shall be duly considered by the Board of Directors, who shall then freely nominate an official ticket, which shall be presented at the April meeting of the Academy, together with such other names as shall have been regularly nominated by not less than ten Active Members and Fellows. The ticket, or tickets, thus announced shall constitute the formal nominations, to which the voting at the May meeting must be confined

SEC. 3. Nominations and elections of the officers of individual Sections shall be in accord with the By-Laws governing the particular Section at the time.

SEC 4 A vacancy occurring at any time in the Board of Directors shall be filled by the remaining members thereof for the unexpired term; should, however such vacancy leave any Section without representation on the Board, the Section thus excluded shall elect one of its own members to serve as Director. Vacancies occurring among the officers of the Academy shall be filled by the Board of Directors from its own number

SEC. 5. No person shall be eligible for re-election to the office of President within one year after having served two consecutive terms. Past Presidents shall be advisory members of the Board of Directors, without vote in such capacity. Notices of all meetings of the Board shall be sent to Past Presidents residing in Southern California

SEC 6 The Chairman of a Section shall be chosen from the Fellows on its membership roll

ARTICLE VIII

AMENDMENTS, ETC

SECTION 1 Alterations of this Constitution, amendments thereof, additions thereto, or repeal of any portion thereof, may be made at any time, by a vote of three-fourths of the Members and Fellows present at said meeting; provided that the changes proposed be amended in writing at a meeting of the Academy, and that the vote be taken at a subsequent meeting, held not less than one month later

BY-LAWS.

ARTICLE I

MEETINGS

SECTION 1 Regular meetings of the Academy shall be held on the first Monday evening of each calendar month, except July and August.

SEC. 2 Regular Section meetings may be held monthly, at such times and places as shall be authorized by the Board of Directors, without whose formal consent no change shall be allowed Special meetings and field meetings may be arranged by the Sections without reference to the Board, but they shall be reported in advance to the General Secretary, for the information of the Board

SEC 3. As far as practicable, the Board of Directors shall provide for meetings of the Academy and of the principal Sections at one and the same place

SEC 4. Special meetings of the Academy may be called by the President, and shall be called at the request of five members, provided that the particular business to be transacted be stated in the call, and that no other business be consummated at such special meeting

[SEC. 5.] Special meetings of any Section may be called by the Chairman thereof, and shall be so called at the request of three members The special business for said meeting shall be stated in the call, and no other business shall be transacted at said meeting

SEC 6. Advice of special meetings of the Academy shall invariably be given to all persons entitled to vote, by written or printed notices, duly mailed, not less than one week in advance of the date thereof

SEC. 7. Annual meetings of the Academy shall be held in the place of the regular May meeting of each year

ARTICLE II

ORDER OF BUSINESS

SECTION 1 The order of procedure at regular meetings of the Academy shall be

1. Minutes of preceding meeting
2. Report of Board of Directors
3. Report of Committees
4. (Special business.)
5. Unfinished business
6. New business
7. *Program for the Meeting, with discussions*
8. Adjournment

SEC 2. At regular meetings of Sections the order of procedure shall be

1. Minutes of preceding meeting
2. Business of the Section
3. *Presentation and Discussion of Papers*
4. Enrollment of Members
5. Adjournment

SEC 3 At each June meeting of the Academy the order of procedure shall be:

1. Brief statement of Plan and Scope of the Academy by the President
2. Annual Reports of Secretary and Treasurer
3. Announcement of donations
4. Election of Honorary Members
5. Necrology
6. Program prepared by the Board of Directors, including installation of President elect and incoming Council
7. Address by retiring President
8. Dismissal by President-elect

ARTICLE III

QUORUM, ETC

SECTION 1. Fifteen members shall constitute a quorum for the transaction of business at regular and special meetings of the Academy, provided that not less than five Fellows be included

SEC 2 Five members present shall constitute a quorum of the Board of directors for the transaction of business not otherwise restricted by the Constitution

ARTICLE IV

COMMITTEES

SECTION 1. There shall be the following Standing Committees of the Board of Directors

1. Committee on Publication
2. Committee on Finance
3. Committee on Membership
4. Committee on Affiliation

SEC 2 Each Standing Committee named in Section 1 of Article IV, shall consist of a Chairman and one member of the Board of Directors, to be appointed by the President, and of the President as a member-by-courtesy, entitled to a vote

SEC. 3 The Committee on Publication shall supervise all publications of the Academy, subject to the control of the Board of Directors. No paper shall be published until after being read, in person or by title, before the Academy or one of its Sections. The Chairman of the Publication Committee shall be the Editor of the Bulletin and other regular publications issued under the authority of the Academy

SEC. 4. The Committee on Finance shall act in an advisory capacity on matters affecting the appropriation and expenditure of funds and the application of grants, donations and bequests and its two appointed members shall also perform the duties of an Auditing Committee, reporting at the Annual Meeting of the Academy upon the condition of the books of the Treasurer

SEC. 5 The Committee on Membership shall be charged with the duty of enlisting suitable members by all appropriate means.

SEC. 6. The Committee on Affiliation shall investigate all applications for affiliation and report to the Board of Directors before final action thereon. It shall be the duty of the Committee [to co-o]perate with the President in appropriate efforts to extend [the i]nfluence of the Academy among local societies, and to in[duce] such bodies to become affiliated with the Academy

SEC. 7. There shall be a Standing Committee on Program, to consist of the President and the Chairmen of all the Sections, whose duty it shall be to arrange suitable programs for all regular meetings of the Academy, under such regulations as may be prescribed by the Board of Directors.

ARTICLE V

DUES AND FEES

SECTION 1. Each active member, upon election, shall pay an initiation fee of One Dollar

SEC. 2. Each active member, upon changing status to Fellow, shall pay a Fellowship fee of One Dollar

SEC 3 Annual dues of Active Members and Fellows, shall be Three Dollars, payable January 1st, in each year

SEC 4 Special dues assessed by any Section, in addition to the established dues of the Academy, shall not exceed One Dollar per annum. All such dues shall be covered into the Treasury of the Academy and applied solely to the current expenses of the individual section, unless otherwise especially authorized by the Board of Directors

ARTICLE VI

ELECTION OF OFFICERS.

SECTION 1. On the day of the annual meeting, polls shall be established as near as may be to the regular meeting place of the Academy, which polls shall be open not less than two hours prior to the hour set for the meeting. The President shall appoint three judges of election to supervise the voting and three tellers to count the votes. All these appointees must be selected from without the Board of Directors, and no person who is a candidate for any office at such election shall be eligible as judge or teller aforesaid

ARTICLE VII

ADOPTION OF BY-LAWS AND AMENDMENTS THERETO

SECTION 1 By-Laws for the further regulation of the Society may, from time to time, be made, and any By-Law or portion thereof, may be temporarily suspended by vote taken at a regular meeting of the Academy, two-thirds of the members present concurring; but such act shall not be operative unless the names of ten Fellows present are recorded in the affirmative

VOL. I. NOVEMBER 1, 1902 NO. 9

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION:
A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER T. B COMSTOCK, Ph. D.

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PLATE I.

FLORA OF PREHISTORIC CALIFORNIA.
Casts of Trees, San Miguel Island, California. Similar formations are found on Santa Rosa Island.

PLATE II.

FLORA OF PREHISTORIC CALIFORNIA.
Casts of Trees, and Dead Shells of Helix, Ayresiana, San Miguel Island, California.

BULLETIN
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VOL. I LOS ANGELES, CAL., NOVEMBER 1, 1902. NO. 9

231 West First Street.

PREHISTORIC CALIFORNIA.

(Continued from August BULLETIN)

BY DR. LORENZO GORDIN YATES.

Before following the procession of animal life from the early Cretaceous Age to nearly the present time, it will be interesting to note the character of the flora which furnished food and shelter for the great armies of herbivores and carnivores which formed some of the divisions of the great faunal procession.

As before stated, plants, having but limited means of locomotion, are forced to accommodate themselves to the changes of climatic conditions which many animals are enabled to escape by migrations to more favorable localities; and the changes of temperature resulting from oscillations of the earth's surface, and other cosmic changes do not affect the flora of a given region so quickly, nor thoroughly, as is the case with the animals.

It is a recognized fact in natural history that, wherever life finds suitable conditions, plants thrive and are reproduced; but no one plant, except a few of the lower forms, is found dispersed over every part of the earth. Each of the multitude of species and forms of plant life which cover the surface of the earth is by its organization restricted to some certain zone or region. It grows and reproduces its kind only in places where the climate and soil are favorable for its particular needs. Plants, however, like animals, are not all equally susceptible to changes of environment, nor in the facility with which they adapt themselves to such changes of their surroundings; if they were there would be no limit to their distribution, and the flora of the entire earth would become uniform.

Plants are confined within certain specified limits by the diversity of their individual requirements, and the conditions favorable for plants are governed by, and dependent upon, the universal factors of environment—air, light, soil, heat and moisture. The last two of these factors are largely governed by altitude above the level of the sea, and therefore subject to changes resulting from the varying elevations and depressions. "It is a fact well established by observation, that the same, or more or less closely

related forms will often appear under similar climatic conditions in parts of the globe widely separated by oceans or deserts." (Charles Mohr.)

On the summits of mountains surrounded at their bases by tropical vegetation, but whose tops are covered for the greater part of the year by ice and snow, plants are found which are at home in the Boreal Zone. And the flora of the Equatorial Zone presents the same general features around the globe. This applies to representative orders if not to specific and generic types.

The study of plant life takes us farther back in the earth's history than the appearance of animal life. Minerals must be studied from a much more remote period, and with these we are carried back to the beginning, if such a term be admissible. This takes us beyond our depth, and to conditions which are beyond our conception. The mind of man, with all his boasted intelligence and reasoning powers, fails to conceive the immensity of space, or the infinity of time or eternity; we cannot conceive anything which has neither beginning nor ending, and the more closely we study the subject the more befogged our minds become in trying to solve the mysteries of nature, and the more we become convinced that the terms are, to our limited comprehension, meaningless.

Before the earth was formed, the mineral constituents of the gaseous substances from which it was subsequently solidified, were in continuous action. No matter whether we call it nature, force, energy or any other name, this power controlled all matter, and eventually evolved plant life, and later, animal life.

Plants and animals are alike composed of mineral substance and are entirely dependent upon the mineral kingdom for sustenance and continuance.

For a period of time of the duration of which we can have no conception, the forces of nature were occupied in the reduction of the gases into liquid and solid matter, and the, to us, inconceivably immense amount of gaseous matter was gradually reduced, by cooling and chemical action, to metals, rocks, liquids, and the surrounding atmosphere. These changes are continuously going on, nor can we conceive the limits (if such there be) to which these forces of nature may extend.

As animals and plants have been advancing to higher and more complex forms it is probable that the womb of time will continue to bring forth still more highly specialized organisms, and the time may come when the puerile man of the present period, with all his vaunted intelligence, and his assertion that he is "Lord of Creation," for whose special benefit the world was made, will be relegated to his proper sphere in the plan of creation,

by the evolution of organisms as far above the man of the present as man considers himself above the worm crawling at his feet.

These advances are not uniform either along various or parallel lines. Forms of life appear, reach their culminating point, diminish and finally disappear, to be followed by organisms of more or less similarity of character and difference of form.

The Plants (represented by the Algæ, or Sea-Weeds) were probably the first to appear in the otherwise supposed lifeless period, and have continued on to the present time. The Acrogens (Ferns, Lycopods and Equisetas) first appeared in the Devonian, or age of fishes, and included many genera of trees; they reached their maximum in the succeeding Carboniferous Age, during which time they conserved immense quantities of carbon from the air, and were important factors in the formation of coal, at the same time changing the character of the atmosphere, and fitting it for the life of the fauna of that and the subsequent Cretaceous Age.

The Conifers (gymnosperms, or plants with naked seeds) first appeared in the Devonian and have not yet reached their maximum.

The Angiosperms (plants having regular flowers and covered seed), another division of the Phænogamous plants, which includes the Maple, Elm, Apple, Rose and the majority of our present trees and shrubs, also appeared in the Devonian.

The Cycads, which are related to the Conifers, but totally different in habit, appeared in the later Carboniferous, attained their maximum in the Cretaceous, and have gradually decreased since that time.

The Palms and Grasses appeared in the later Cretaceous, and have continued without diminution to the present time.

The microscopic Diatoms appeared in later geological periods, and their fossil remains form extensive deposits or diatomaceous rock and diatomaceous earth, which consist principally of the silicious cases of these minute plants which are so infinitessimally small that the strongest powers of the microscope are required to bring out their form and beautiful specific characters. Their minuteness and comparatively indestructible nature render them valuable for the separation of minute particles of the material used in the manufacture of dynamite, and other uses in the arts and sciences.

THE ORIGIN OF NEW SPECIES OF PLANTS.

The mass of incontrovertible evidence of the continuous changes which have taken place in the animal and vegetable life of past ages, forces us to the conclusion that the creative force or power which evolved life on the earth, is continuous and ever-acting, as active today as it was thousands of years ago. The his-

tory of man is too meagre to record more than slight indications of a process of change which, if continued for a time equal to those ages which were required to bring about the great alterations in the topography and in the forms of animal and vegetable life already considered, would be as radical and evident as are those of the past periods of the earth's history which, in the preceding pages, we have endeavored to portray.

An eminent naturalist of Amsterdam, Holland, in a recent publication, has given the results of a long and careful series of experiments, and from his conclusions in relation to the origin of new species of plants I quote as follows:

"Plants undergo very long periods of constancy alternately with periods in which new species may be produced.,' And that, "Each species has originated from another at such a time." For this it is held that it is not necessary that the mother species be changed in any way, but that it may continue with all its former characteristics unchanged.

His observations were made from plants growing in natural conditions, as well as seed collected from wild plants and sown in gardens. He has originated from the original wild species twelve distinct forms which have come true to seed. The conclusion is drawn that species originate suddenly without intermediate forms or any other preparation. From the beginning they remain unchanged during the subsequent generations.

"Mutation seems to take place in various directions, and not in any predetermined manner." (Proc., Sec. Sci. Koninkl. Akad. Wetersch. Amsterdam, 1901, III, pp. 245-247.)

FOSSIL PLANTS.

The fossil plants of a given region are not as definitely indicative of the comparative duration, and the dividing lines between the minor geological epochs as are the fossil animals, but they serve as valuable records of the well defined periods and ages of the earth's history. The fossil remains of animals may be likened to the paragraphs of a book of which the fossil plants resemble the chapters. Or, the records of the lives of fossil animals may be considered as representing the minutes, and those of the plants as the hours of the day in considering the geological history of the earth.

The science of palæontology is in its infancy, and much remains to be discovered and studied before the geological history of the earth can be satisfactorily translated and transcribed for man's reading.

One of the most noted localities for fine fossil remains, and one which also represents some of the most interesting and instructive lessons in the history of the world, is the Isle of Shep-

pey, in the British Channel, where the writer when a small boy amused himself collecting fossil shark's teeth, fishes, turtles, birds, crabs, lobsters, mollusks and other animal remains, found with fossil fruits of unknown extinct palms and other trees, which all occur there in a remarkable state of preservation. These fossils in which the original substances have been replaced by iron pyrites are in such abundance that they are collected on the sea shore by the inhabitants and sold by the ton to the manufacturers of sulphuric acid and sulphate of iron (copperas).

These fossils afford abundant evidence of the material changes in the topography and climate of the region in comparatively recent geologic times, and prove the former existence, during the Eocene Period, of a large river which formed an estuary near the present mouth of the river Thames, where the immense amount of material representing tropical animals and plants were deposited.

The banks of this ancient river were lined by magnificent palms, ferns, and other tropical plants, inhabited by curious birds, reptiles and extinct mammals, while its waters teemed with sharks, fishes and reptiles.

"But suddenly, from causes yet unknown,
All Northern latitudes were clad with ice,
So tense the cold great lakes and rivers froze
In mass, and teeming lands were thus bereft
Of animated life, which perished there
In one vast frozen sepulchre"

FOSSIL WOOD.

Among the most widely distributed of the relics of past ages are fragments of the leaves, flowers, fruits and branches of fossil plants, and the wood, and sometimes the entire trunks of trees are found in abundance in strata of the earth's crust. Various minerals have replaced the original substance, rendering them practically proof against the destructive action of the elements.

This substitution is so complete that the specific characters of the plant or tree are perfectly preserved and the species may be readily determined.

The minerals which are the most common substitutes for the original material are Silica in various forms; Carbonate of Lime; Carbon, and Sulphuret of Iron ("Iron Pyrites"), and the substitution of pseudomorphism is so complete and perfect that, thin sections prepared for the microscope present all the optical characteristics and minute details of the living plants. Ores of Copper and Iron, Native Sulphur, Sand, Silt, Salts of Lime, and other mineral substances form casts in the moulds made by

the decay of the original plants. These preserve only the form and the exterior characters of the original. See Pl. 1 and 2.

Plate 2, from a photograph taken on San Miguel Island, one of the islands forming the southern line of the Santa Barbara Channel, on the coast of California, shows the casts of trees which were probably killed by volcanic agency, and afterwards decayed, surrounded by shells of dead snails of a nearly extinct species. The molds formed by the decay of the trees were filled with drifting sand and cemented by mineral substances held in solution by the water which permeated the surrounding soil.

The soil was subsequently carried away by the prevailing winds, leaving the casts as shown in the illustration. The reason for this was that after the advent of the whites thousands of sheep and cattle were turned loose upon the island and increased so rapidly that they eventually destroyed large areas of the vegetation which had protected the surface from the disturbing agencies of the elements; the soil thus exposed was carried away by the wind and rain and the surface covered by drifting sand.

The land snails thus deprived of the succulent vegetation upon which they had subsisted, perished by millions, leaving acres upon acres of ground covered with their dead shells, as seen in the illustration.

These shells (Helix Ayresiana) are foun only on the islands of San Miguel, Santa Rosa, Santa Cruz, and one or more of the Anacapas, where the "sheep and cattle industries" have nearly exterminated them, thus illustrating the effects of the destruction of the vegetaion upon some of the forms of the animal life of a region.

Twenty-five years ago the writer found extensive areas of the same character on Santa Rosa Island, the casts of trees were then standing, and the ground was covered with dead snail shells in greater abundance than is shown on this illustration.

(To be Continued.)

Sphaerostigma erythra, n. sp.

BY A. DAVIDSON, M. D.

Annual, slender, upright, branching freely 6 in. to 1 ft. high, whole plant minutely puberulent and glandular throughout, stem generally purplish especially in the taller specimens, epidermis not flaking: lower leaves ovate-lanceolate 1 to 1½ inches long, ¼ inch wide, tapering to petiole, slightly repand-denticulate, midrib prominent beneath; floral leaves similiar, above entire and much smaller; petioles of radical leaves 1 in. long, those of the lower cauline ½ inch.: flowers numerous, axillary, minute, petals 1 line long, light red becoming darker in age: sepals reflexed in flower, calyx finely puberulent and glandular, tube obconic very short; capsule 2 in. long, ½ line broad, obtusely angled, slightly curved with almost truncate tip, sessile, not adnate to the leaf.

In habit, this plant somewhat resembles *S. strigulosa* T. & G. but in foliage and flower it is quite different. Collected by the author in April, 1900 on the rocky slope of the San Francisco River near Clifton, Arizona, at an alt. of 3,500 to 3,800 ft.

No. 244. Los Angeles.

SPHAEROSTIGMA ERYTHRA,, n. sp Plate IX.

The Southern California Species of Calochortus, II.

BY S. B. PARISH.

CALOCHORTUS PLUMMERÆ, Greene, Pitt. 2.70. (1890) *C. Weedii purpurascens*, Watson, l. c. 265. 1879, Purdy, l. c. 132.

Stems 3-8 dm. high, bulbiferous near the base; leaves broad; bracts linear: sepals lanceolate-accuminate, usually with a tuft of hairs within near the base, scarious, about equalling the petals; broadly cuneate-obovate, 3 cm. long, rich purple, lighter in color and densely hairy on the lower half; gland large, surrounded with a dense fringe of long hairs; anthers oblong, acute mucronate 1-1. 5cm. long, equalling or exceeding the filaments; capsule 3-5 cm. long.

Common on dry slopes and mesas along the southern base of the San Bernardino Mountains, and ascending there to 5,000 ft. alt. The type of *C. Plummeræ* was collected in Mill Creek Canyon, by Mr. Lemmon in 1876; the types of Watson's variety were from "Cajon pass and Santa Barbara," But the Santa Barbara plant has been separated by Mr. Purdy as *C. Weedii vestus*. The flowers vary somewhat in the depth of coloration, but otherwise are quite constant. It is well separated geographically from *C. Weedii*.

CALOCHORTUS CLAVATUS, Watson, l. c. 265. Purdy, l. c. 134.

Stems stout, 3-6 dm. high, bulbiferous near the base; bracts linear; ovate-lanceolate, accuminate, with or without a brownish spot near the base, about equalling the petals; petals cuneate-obovate, yellow, tinged with brown, 3-4 cm. long, the lower half clothed with long clavate hairs; gland circular, deep, bordered with imbricated scales; anthers purple, obtuse, 8-10 mm. long, about equalling the filaments; capsule narrow, about 5 cm. long,

Foothill canyons near Los Angeles, north to San Luis Obispo. The type was collected at the latter place by Mr. J. G. Lemmon, in 1878.

† † *Inner surface of the petals clothed with scattering hairs.*

CALOCHORTUS CONCOLOR, Purdy, l. c. 135. *C. luteus concolor*, Baker, Garden, Dec. 7, 1895, t.

Stems 2. 5-5 dm. high, bulbiferous near the base; leaves

narrow; bracts short, linear; sepals broadly lanceolate, purplish green and strongly ribbed exteriorly, within yellow, with 1-2 conspicuous red-purple lunate markings near the base; petals broadly obovate-cuneate; clear lemon yellow, with a narrow horizontal red-purple marking across the center, yellow hairy up to this mark; gland circular, brown and hairy; anthers yellow obtuse, 1 cm. long, on filaments of the same length; capsule 2. 5-3. 5 cm. long.

Bushy hills from Mill Creek in the San Bernardino Mountains (alt. 3,500 ft.) to the coast of San Diego County. Mr. Purdy is in error in calling this a desert species. All the stations named by him are on the seaward side of the mountains, which may be taken as the extreme inland boundaries of the species. It is a much commoner plant in San Diego County than in Riverside and San Bernardino.

The character is drawn from fresh specimens of the Mill Creek plant, and will be seen to differ considerably from Mr. Purdy's description, which was based on a plant collected at at Laguna, San Diego County, by Mr. D. Cleveland. This indicates a considerable degree of variation, and these plants, perhaps, might better be left as a variety of *C. luteus;* but I prefer, at least for the present, to follow Mr. Purdy's disposition.

True *C. luteus* does not occur probably south of Monterey; Mr. Purdy's San Diego reference being founded on an apparently erronious label.

CALOCHORTUS SPLENDENS, Dougl. ex. Benth. Trans. Hort. Soc. Ser. 2, 1:411, t. 15, f. 1. Watson, l. c. 266. Purdy, l. c. 143.

Stem single, 3-6 dm. high, usually branched above, bulbiferous at base; sepals lanceolate-accuminate, yellowish, with an oval purple spot near the base within; petals obovate-cuneate, 3-4 cm. high and of greater width, finely erose at summit, light lilac with a small purple blotch at base surrounding the roundish densely hairy gland, the lower third sparsely hairy to, but not below, the gland; anthers dark purple, obtuse, 1 cm. long on filaments of the same length or shorter; stigmas 2 mm. long; capsule slender.

Common on bushy hills or mesas in the interior, and ascending the San Bernardino Mountains to 5,000 ft. alt.; north only to Santa Barbara, according to Purdy, but to Lake and Colusa Counties according to Jepson.

Calochortus striatus, n. sp.

Corm small, membraneously coated; subterranean stem usually 10-12 cm. long, divided at the surface into 2-3 slender erect branches 1-3 dm. high; leaves several 4-25 mm. wide and nearly as long as the stem-branches; the short rigid accuminate bracts hyaline margined; flowers 2-8, umbellate; sepals oblong accuminate nearly or quite as long as the petals, the tip at length reflexed; petals broadly obovate-cuneate, centrally apiculate, light purple uniformly striate with darker purple, the lower half sparsely white hairy; gland acutely triangular, densely tufted with ascending whitish hairs; anthers oblong, obtuse, 5 mm. long on filaments of twice the length; immature capsule 4 cm. long.

In alkaline meadows at Rabbit Springs, alt. 2,700 ft., Mojave Desert, May, 1882, *1342 Parish.* (type); June, 1884; June, 1901, *5,000 Parish.* Also at Cushenberry Springs in the same region. The original collection was distributed as *C. flexuosus*. The so-called "meadows" are barely damp enough to support a sparsh growth of *Distichlis*. The accompanying plants are three species of *Cleomella*, *Houttuynia Californica*, *Cnicus Mohavensis*, and one or two Atriplicis. To find a Calochortus growing in such an alkaline association is certainly remarkable.

† † † *Petals nude except at or near the gland.*

† † *Petals self colored, never oculate.*

CALOCHORTUS PALMERI, Watson, l. c. 266. Purdy, l. c. 144.

Corymb membraneously coated, oblong stems slender, erect, 3-5 dm. high, bulbiferous at base; leaves narrow and short; bracts linear; sepals oblong, shortly accuminate, with a purple stain at base, the tip at length recurved; petals rather narrowly obovate-cuneate, about 2 cm. high, white to very light purple, the claw brown; gland large, undefined, short, hairy, and with a few surrounding scattering hairs; "capsule very narrow, an inch long, or more."

The type was collected "near the Mojave River, n. 527, Palmer, 1876." It was almost certainly at the point where the Mojave River makes its exit from the San Bernardino Mountains; a place then known as Holton's ranch, afterwards as Borcham's, and now as Los Flores Rancho. The altitude is about 3,500 feet. The above characters, except for the capsule, which is quoted from Watson, is drawn from specimens collected

at this place in May, 1882, 1341 Parish, which accurately match Palmer's specimens in the Gray Herbarium. My No. 1857, June 14, 1886, collected at Cox's Ranch in the same region, is probably the same, but my subsequent distributions under the name of *C. Palmeri* are forms of *C. invenustus*. The collections above cited appear to be the only ones that have been made of this still little-known species. It is best recognised by what is rather a glandular blotch, than a well defined gland.

CALOCHORTUS DUNNII, Purdy, l. c. 147, t, 19, f. 14.

Stems slender, not bulbiferous at base, 3-10 dm. high; leaves narrow, folded, shorter than the stem; bracts short; sepals ovate-acute yellowish green, faintly purple spotted near the base within, narrowly scariously margined, about half as long as the petals; petals broadly cuneate, rounded above and erose, 2.5 cm. broad and as long, white with a brown, ragged transverse band crowning the gland; gland round 3 mm. in diameter, densely matted with short yellow hairs, a few of which are scattered on either side; anthers light yellow, mucronulate, 3 mm. long, on hyaline margined filaments of equal length; capsule acnte or at most shortly beaked.

Type collected near Julian, San Diego County, by Geo. W. Dunn. Described from specimens of Mr. Dunn's collecting, communicated by Mr. Purdy.

CALOCHORTUS INVENUSTUS, Greene, Pitt. 2:71. Purdy, l. c. 145.

Stems 2-5 dm. high, bulbiferous at base; leaves narrow; bracts linear short ; sepals ovote-oblong, shortly accuminate, striate and scarious-margined, the tips not recurved, shorter than the petals; petals about 3 cm. long, obovate-cuneate the rounded summit centrally apiculate, dull white, tinged greenish and purplish, the short claw purple; gland oblong covered with light hairs, and with a few scattered hairs near; anthers 5-7 mm. long, obtuse at apex, yellow, on narrowly margined filaments a little shorter; capsule 4 cm. long by 1 cm. wide, acute.

Common on dry slopes in open coniferous forests in the San Bernardino (Bear Valley) and San Jacinto (Strawberry Valley, Tauquitz Valley; Hall) Mountains, at 6,000-8,900 ft. alt. Occasionally grows also in damp meadows, according to Mr. Hall.

The type was collected by Dr. Greene, June 25, 1889, in

"the higher mountains to the westward of the Mojave Desert"; probably near Tehachapi. It is not a satisfactory species to the field student, its great variation in size and color suggesting that it may be no more than a variety of *C. splendens.* But for the present it is best maintained. The color varies from nearly white to light purples, usually dull and greenish tinged.

CALOCHORTUS INVENUSTUS MONTANUS. *C. splendens montanus*, Purdy, l. c. 144 at least in part.

An extreme form of these variations, with shorter and slender stem; petals clear dark lilac purple, with no trace of the dull white or green of the species; claw yellow.

Same range as the species, with which it grows, and for this reason, at least, must go with it, if the species is retained. It is well connected with it by intermediates.

CALOCHORTUS KENNEDYI, Porter, Bot. Gaz. 2.79. Watson, l. c. 265. Purdy, l. c. 135.

Stems 2 cm.-3dm. high, not bulbiferous at base, 1-few flowered leaves and bracts narrow; sepals ovate-oblong, acute; erect, two thirds the length of the petals, brown without vermilion within, scarious margined; petals brilliant vermillion, the base and claw purple, nude except for a few hairs near the small circular, densely-hairy gland; anthers ovate-oblong, 5 mm. long, on filaments of twice that length; capsule 4-5 cm. long 1 cm. wide.

Common on dry gravelly or clayey mesas and hillsides of the Mojave Desert at 2,500 to 4,000 ft. alt., and rarely ascending the desert slope of the San Bernardino Mountains even to 7,000 ft. alt. (Gold Mt.) The range of this species extends north to Mt. Magruder, Esmeralda Co. Nevada[5], and east into Arizona. In our region it is very constant in coloration, but orange or creamy-yellow flowers are sometimes seen.

†† *Petals normally oculate*

CALOCHORTUS VENUSTUS, Dougl. ex. Benth. Trans. Hort. Soc. Ser. 2,1:412, t.15. Watson, l.c. 265, Purdy, l.c. 140, t.19, f.10.

Stems 2-6 dm. high basal bulblet single; leaves and bracts narrow; sepals oblong-lanceolate, 3-5 cm. long, acute, about equalling the petals; petals broadly obovate-cuneate, broader than long' white, shaded above with lilac, a conspicuous reddish-purple spot near the top, a brownish-yellow arch in the center, and a brown base, but these markings sometimes faint and

obscure; gland large, oblong or lunate, densely hairy and surrounded by a few scattered hairs; anthers oblong, obtuse on dilated filaments of nearly equal length; capsule narrow, 5-7 cm. long

On open hills Newhall; Elizabeth Lake; Ft. Tejon. This appears to be the southern limit of this species, which extends as far north as Vacaville[6]. [6]Description from plants growing at Elizabeth Lake.

This species breaks into an infinite variety of coloration, the markings assuming different tints or becoming obscured, or entirely disappearing, the petals becoming self-colored, and of various shades. An indefinite number of color-varieties might be described; a few have received names.

CALOCHORTUS VENUSTUS PURPURASCENS, Watson, l.c, 266.

Petals deep liliac or purple, with marking similiar to those of these species.

Ft. Tejon, Kern County.

CALOCHORTUS VENUSTUS SULPHUREUS, Purdy, l. c. 141.

Petals a light warm yellow, with eye in centre, and a rose-colored blotch at top.

Newhall, Los Angeles County, and Alcalde, Kern County, according to Purdy.

[5]F. V. COVILLE, Death Val. Rep. 279.
[6]W. L. JEPSON, Man. Fl. Mid. Cal. III.

San Bernardino, Cal.

Tribal Character in the Separation of the Style-Branches in the Compositae.

BY LOUIS A. GREATA.

The somewhat peculiar appearances of the disk of a developing head of *Grindelia robusta* directed my attention to the fact, that the separation of the style-branches of the hermaphrodite florets occurs in a different manner in different groups of the Compositæ and an examination of a number of plants leads me to believe, that this interesting feature is sufficiently constant to form a simple and useful aid to classification in that admittedly difficult Family.

In plants examined of the Tribes Inuloideæ, Helianthoideæ,

Helenioideæ, Anthemideæ and Senecionideæ, the style-branches begin to separate from the apex while in those of the Asteroideæ examined, they begin to separate from below the apex, forming a more or less distinct loop which disappears upon complete separation. The former might conveniently be termed Apici and the latter Sub-Apici.

In the determination of a Composite one is, at the outset, confronted with a distinction of the style-branches and appendages which is by no means clear, but the difficulty will be greatly simplified if it is found that the sub-apicial separation of the style-branches is peculiar to and constant in the Asteroideæ. I therefore venture to examined with a few brief notes:—

SUB-APICI

Tribe III. Asteroideæ

Aster. Cultivated species probably A. Novae Angliæ
Bigelovia veneta
Erigeron foliosus var. stenophyllus
Gutierrezia Euthamiae
Heterotheca floribunda

APICI

Tribe IV. Inuloideæ

Gnaphalium Sprengelii

Tribe V. Helianthoideæ

Coreopsis tinctoria var. atro-purpurea (cult.)
Hemizonia fasciculata var. ramosissima
Hemizonia tenella

Tribe VI. Helenioideæ

Chænactis glabriusculus and other species

Tribe VII. Anthemideæ

Achillea millefolium var. rosea (cult.)
Chrysanthemum (cultivated, pompom type.)
Matricaria discoidea

Tribe VIII. Senecionideæ

Senecio Douglasii.

For this examination many of the specimens were preserved in diluted alcohol but this was found unsatisfactory and I think the characteristics sought would be clearer even in dried specimens; fresh ones are of course, the best.

Erigeron does not show the separation well after soaking

but my recollection is that it is easily apparent in fresh material and I find this is true of several of the species examined.

In *Heterotheca floribunda* the style-branches are not especially distinct from those of some other tribes but the sub-apicial separation is very marked.

Both species of Hemizonia examined show long slender subulate style branches easily confused with Asteroideæ except that the separation is apical. This is true also of the Chænactis examined.

The following plants are reported from memory as having been examined.

SUB-APICI

Tribe Asteroideæ

Grindelia robusta

Chrysopsis sessilifolia var. echoides

Lessingia glandulifera

Corethrogyne filaginifolia

Tribe V. Helianthoideæ

Helianthus annuus

I have not had an opportunity to test any of the species of the Tribe Vernonaceæ. A cultivated Stevia (Eupatoriaceæ) shows a mode of separation distinct from any of the foregoing. In the bud, the style-branches lie flat and complanate. The separation is apical but instead of reflecting from the apex, the style-branches open out as if hinged near the base and the tips show a tendancy to curl inward and as soon as the plant begins to wilt, the style-branches become circinate, curled in toward each other.

In *Centaurea melitensis* (Cynaroideæ) the style-branches do not separate; in fact the style is tipped with three short subulate lobes scarcely distinguishable except under a compound lens.

Perezia microcephala (Mutistiaceæ) shows style-branches not unlike *Senecio Douglasii* but the Tribe is easily distinguished by its labiate florets.

I believe further investigation in this direction will show that it is possible to construct a key to the tribes that would obviate the necessity of considering so many confusing features as at present. If so, it would be valuable in the field and often helpful in the herbarium, and would not interfere with the established order of things.

Transactions.

The regular meeting of the Academy of Sciences was held at the Woman's Club Rooms at 8:00 p. m., Oct. 6th 1902. The meeting was called to order by President Comstock. The Secretary being absent, G. M. Taber was appointed Secretary pro tem. The new Constitution and By-Laws were read section by section, and after several amendments were adopted as amended. A motion was made and carried by a unanimous vote, that the Board of Directors be authorized to incorporate the Academy under the Constitution and By-Laws adopted. The President stated that in order to establish the Sections, it would be necessary for petitions to be presented before the Academy of the names of Fellows, in accordance with the requirements of the new Constitution. After the regular business of the Academy had been concluded, Mr. Wm. H. Knight read a paper on the Life and Work of Hugh Miller, the noted Scotch Geologist, it being near the 100th anniversary of his birth. His paper was full of historical interest, interspersed with a statement of his personal life and his distinguished work as one of the world's most prominent scientists. President Comstock in a brief manner called the attention of the audience to the similarity between Major J. W. Powell and Hugh Miller. He also stated that in a long and intimate acquaintances with Major Powell, it had been of material benefit to himself when he was a young man. Prof. G. Wharton James made a few interesting remarks on the life work of Major Powell. The meeting then adjourned. G. MAJOR TABER, *Sec'y pro tem.*

An outdoor meeting of the Astronomical Section was held on the thirteenth of October, at the residence of the Chairman, B. R. Baumgardt. About a hundred members were present. The evening was devoted principally to telescopic observations of the planets Jupiter and Saturn. Perrin's recently discovered comet was shown in the constellation Cassiopea and its southwest motion through the heavens towards the sun observed. Excellent views were also had of the nebula in Andromeda, the star cluster in Hercules, the quadruple star Epsilon Lyra and the binary system Beta Cygni. Short addresses were made by some of the members after which the meeting stood adjourned. MELVILLE DOZIER, *Secretary.*

Regular monthly meeting of the Botanical Section was held Aug. 25, 1902, Mr. Johnston presiding.

Mr. Greata submitted for inspection a collection of plants belonging to Mr. Geo. B. Grant consisting of Cryptanthes, Plagiobothrys and allied genera.

Mr. Braunton submitted miscellaneous plants including some interesting specimens of *Godetia purpurea*, both purple and yellow forms.

Mr. Davidson reported upon the proposed new constitution of the Academy. Adjourned, LOUIS A. GREATA, *Secretary.*

The Geological Section met at the Woman's Club Rooms, Sept. 22d, 1902. at 8:00 p.m. Chairman Geo. W. Parsons called the meeting to order.

Prof. L. J. Stabler was introduced and gave an interesting lecture on California Mineral Oils and Their Chemical Analysis." He stated in part, that there was no danger of an overproduction of Oil, as the local demand at the Los Angeles Refineries was 50,000 barrels per day, besides what was used for fuel. He explained the advantages of California asphalt over that of Trinidad and Bermuda productions, and stated that the Eastern demand for California asphalt was increasing, owing to its superior qualities. He enumerated the many uses of its chemical products in the arts, and gave 14 different ingredients composing the California oils, where the Pennsylvania oils had but 9. He also stated that the California oils were superior for lubricating purposes for cold climates or ice machinery, but not as valuable lubricants in hot climates. G. MAJOR TABER, *Sec'y.*

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231 West First Street.

PRESHISTORIC CALIFORNIA.

(Continued from November BULLETIN)

BY DR. LORENZO GORDIN YATES.

These fossils in many instances owe their preservation to the originals having been submerged in alkaline waters holding silica in solution, and heated by volcanic action. Sometimes forests of trees have been submerged and still remain standing in the soil in which they grew, furnishing unmistakable and indestructible evidence of cataclysms resulting from seismic disturbances, of which perhaps no other intelligible records remain.

In other instances the forests were uprooted or broken down by avalanches of volcanic mud, or rushing water and buried by volcanic material deposited by the water, or by showers of volcanic ash.

One of the most noted "petrified forests" of California is located in Napa County, about ten miles south of the summit of Mount St. Helena, an extinct volcano which is supposed to have caused the death of the trees then living and their subsequent preservation in the fossil state. The late Professor O. C. Marsh described his visit to the locality with a party from Yale College in 1870.* He says:

"A careful examination of the locality where the first prostrate trunks had been discovered soon made it evident that those now on the surface had all been weathered out of the volcanic tufa and sandstones, which form the summit of this part of the mountain ridge. Several large silicified trees were, indeed, subsequently found in the vicinity, projecting from the side of a steep bluff, which had partly escaped denudation. Extending our explorations among the mountains for several miles around, we were rewarded by the discovery of many additional fossil trunks at various points, showing conclusively that this Tertiary deposit contained the remains of an extensive forest of very large trees, which had apparently been overthrown and entombed by some volcanic irruption. Portions of nearly one hundred distinct trees scattered over a tract three or four miles in extent, were found

*American Journal of Science and Arts, Vol. I, Ap. 1871.

by our party, and the information we received from hunters and others, familiar with the surrounding country, renders it more than probable that the same beds, containing similar masses of silicified wood, extend over a much greater area.

The fossil trees washing out of this volcanic tufa were mostly of great size, and appeared to be closely related to some of the modern forests of the Pacific Coast, especially the gigantic Conifers. One of the prostrate trunks examined during our explorations was partly exposed above the surface, dipping with the strata about 10 degrees to the northward. Its accessible portion, evidently but a small part of the original tree, measured sixty-three feet in length, and, although denuded of its bark and very much weathered, was over seven feet in diameter near its smaller end. All the trees discovered were prostrate, and most of them, after their petrifaction, had been broken transversely into several sections, apparently by the disturbance of the enclosing strata. A majority of the trunks had a general north and south direction, probably due to the course of the current that covered them with volcanic eruption. Portions of nearly one hundred distinct trees, tion in which they had fallen. Several of the trunks had portions of their roots still attached, and some were evidently much decayed internally and worm eaten before their entombment. All the fossil wood observed was silicified, by means of hot alkaline waters containing silica in solution, a natural result of volcanic action, especially when occurring with water, as was evidently the case in the present instance.

"Our party discovered on the western side of the Napa valley, along the base of the ridge, patches of a deposit of stratified tufa and gravel, which was evidently identical with that containing the fossil trees on the summit. This would seem to imply that the upper portion of the valley had once been filled with these peculiar beds, and, through their denudation, gradually assumed its present proportions. However that may be, this volcanic deposit and its contents is certainly of great interest, even in this land of geological wonders."

The "Auriferous Gravels" and the "Dead Rivers" of the western slopes of the Sierra Nevadas, are noted localities for the variety of fossil wood called "Wood Opal" found in the mines. Many of the specimens found, especially those of a fragmentary character, are gem-like in their beauty of coloring and markings; black, browns, reds, yellows, grays and white in all the combinations; massive, fibrous, friable, opaque and translucent and intermediate characters have been found in the gravels. Immense trees are often "piped" out in the process of hydraulic mining for gold; some of them are almost adamantine in their hardness; others vary greatly in their character; irregularly shaped, chalcedonic, or jaspery masses, compact as quartz crystals, are imbedded

in portions of the same tree, which may be granular and friable; Others solid and amorphous throughout, or changing in the space of a few inches to a fibrous, easily separable mass of silicious, silky threads, or to carbonaceous matter but little changed from its original ligneous character.

Around the bay of San Francisco, and at other localities, trunks of redwood trees, which have undergone but little change, are often encountered in drilling for artesian wells; on the east side of the bay these fossil trees are usually found at a depth of about two hundred feet.

California during the earlier geological ages not having emerged from its ocean bed, had a very scanty flora. During the Cretaceous Age, some fragments of the trees which grew on the limited area of land were floated out into the cretaceous sea, became silicified, and were buried in the silt of the ocean bed, and may be found occasionally in the cretaceous rocks which have been exposed in different localities in the State. Specimens of this character, which before being silicified, had been bored by the Pholads, or "Boring Mollusks," have been found by the writer in the ammonite beds of Shasta County, and other fossilized fragments in Alameda County, in which locality the fossil wood formed the nuclei of concretions of indurated clay and sand.

In the later geological periods, after the emergence of the land, terrestial plants grew upon the entire area of dry land, and their fossil remains have been imbedded in the strata of the rocks in such an excellent state of preservation that the laminae may be separated, showing the leaves and other portions of the trees and plants preserved between the laminae, like fossil photographs of the vegetable life of bygone ages.

The following is a list of the known fossil plants of California, except such as have not yet been determined.

Some of the species submitted to the eminent paleobotanists, the late Professor Leo Lesquereux, and Dr. J. S. Newberry, were not published during their lifetime, and will probably be determined or described by others.

CRYPTOGAMAE.

ALGAE.

Fucoides are found in the Cretaceous rocks, and in a great many localities in the Tertiary; in Alameda County specimens were brought to me as "Fossil Snakes," or "Fossil Eels," which proved to be the stems of fossil sea weeds.

EQUISETACEAE.

Equisetum (Horsetail).

Equisetum sp.— Corral Hollow, San Joaquin County; Miocene.

Equisetum, undeterminable species, related to E. Wyomingense Lesq. Contra Costa County; Miocene.

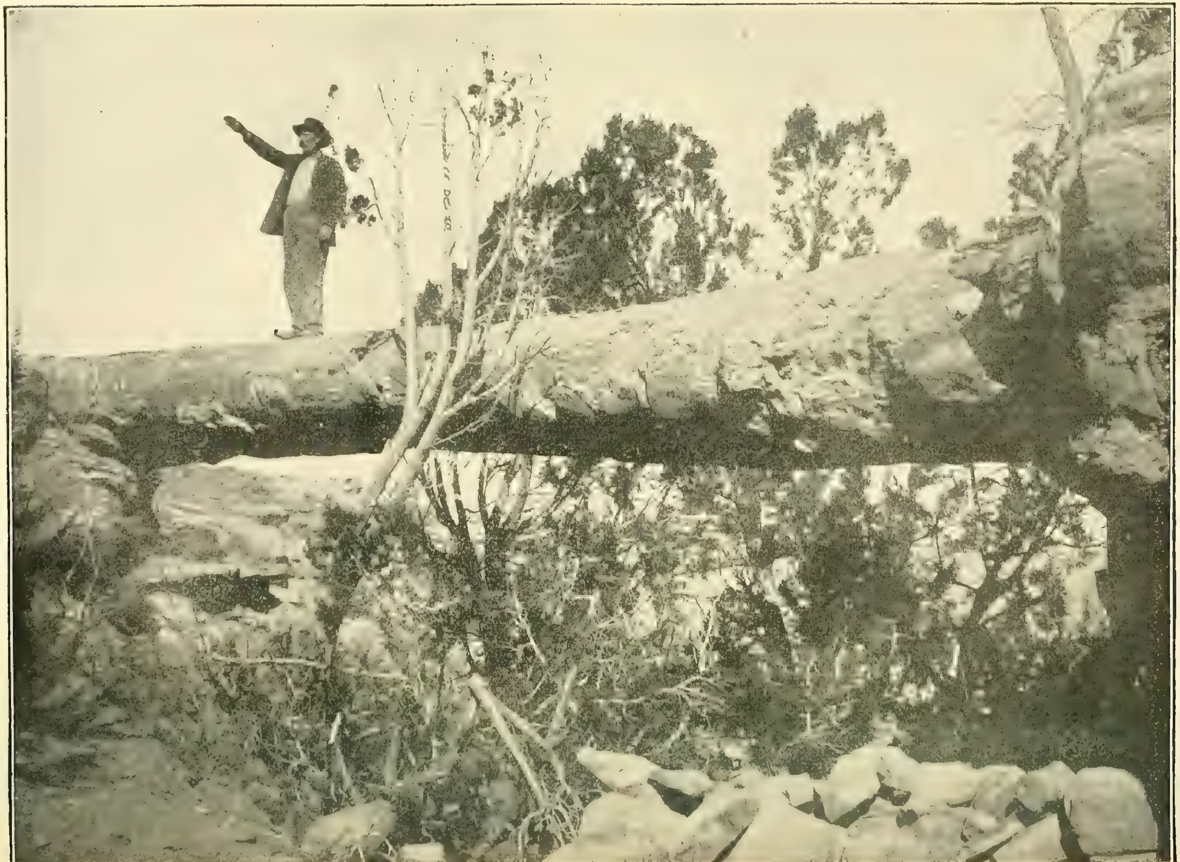

PLATE [illegible].—NATURAL BRIDGE IN PETRIFIED FOREST

[illegible] Report, 1890. Courtesy of S. G. Langley, Secretary.

GYMNOSPERMS (Plants with seeds).

CONIFERAE (Cone-Bearers).

Sequoia.

Sequoia angustifolia, Lesq.; a kind of Redwood, has been found in the Miocene at Corral Hollow, San Joaquin County; This genus is a supposed waning type of plant life, as of the forty or more species which have been found fossil the two well-known Californian species are all that have come down to the present time.

Taxites.

Taxites Olriki, Heer; resembling the Yew trees; Corral Hollow, San Joaquin County; also found in Alaska and Greenland.

PALMAE (Palms).

Geonomites.

Geonomites schimperi Lesquereux; an extinct palm tree; Contra Costa County; Santa Barbara County.

Sabalites (Palmetto).

Sabalites Californicus, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

APETALAE.

MYRICACEAE (Amentaceae).

Myrica (Wax Myrtle).

Myrica ungeri, Heer; Plumas County; Miocene. Nearly forty species of this genus are found living, distributed throughout nearly all temperate parts of the world; Two species are abundant in North America which have probably descended from the fossil forms.

Betula (Birch).

Betula aequalis, Lesq.; Chalk Bluffs, Nevada County; Miocene.

Alnus (Alder).

Alnus corralina, Lesq.; Corral Hollow, San Joaquin County; Pliocene and Miocene.

CUPULIFERAE (Fugaceae).

Fagus (Beech).

Fagus antipon, Heer; Table Mountain, Tuolumne County, in Pliocene and Miocene; also in Alaska; British Columbia and Europe.

Quercus (Oak).

Quercus boweniana, Lesq.; Bowen's Claim, Nevada County; Pliocene.

Quercus convexa, Lesq.; Table Mountain, Tuolumne County; Pliocene.

Quercus distincta, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Quercus elaenoides, Lesq.; Table Mountain, Tuolumne County; Pliocene.

Quercus furcinervis, Rossmassler; Plumas County, California; Bridge Creek and Cascade Mountains, Oregon, under a volcanic overflow (Professor Joseph Le Conte). Miocene and Eocene.

Quercus goepperti, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Quercus morii, Lesq.; Lassen County; Miocene.

Quercus nevadensis, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Quercus olafseni, Heer; Table Mountain, Tuolumne County; Lassen County; Pliocene and Miocene. Also found in Dakota; Utah; Greenland.

Quercus pseudo-chrysophylla, Lesq.; Forest City, Sierra County; Pliocene; perhaps the living Quercus densiflora.

Quercus pseudo-lyrata, Lesq.; Nevada County; Pliocene.

Quercus steenstrupiana, Heer; Forest City, Sierra County; Pliocene and miocene. Also found in the Arctic regions; Greenland.

Quercus transgressa, Lesq.; Sierra County; Pliocene, perhaps the living Q. chrysolepis.

Quercus voyana, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Castanea (Chestnut).

Castanea ungeri, Heer; Rock Corral, Placer County; Corral Hollow, San Joaquin County; Miocene. Also in British Columbia; Alaska; Greenland; Europe.

Castanopsis (Chinquapin).

Castanopsis chrysophylloides, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

SALICINEAE.

Salix (Willow).

Salix californica, Lesq.; Table Mountain, Tuolumne County; Pliocene.

Salix elliptica, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Salix integra, Goeppert; Corral Hollow, San Joaquin County; Miocene.

Salix varians, Goeppert; Table Mountain, Tuolumne County; Corral Hollow, San Joaquin County; Tertiary. Also Alaska; Greenland and Europe.

Populus balsamoides, Goeppert; Corral Hollow, San Joaquin

Populus zaddachi, Heer; Nevada County; Tertiary. In the in-

Populus (Poplar).

Populus balsamoides, Goeppert; Corral Hollow, San Joaquin County; Pliocene.

Populus zaddachi, Heer; Nevada County; Tertiary. In the interior of our county many other species are found.

Platanus (Sycamore).

Platanus appendiculata, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Mountain, Tuolumne County; Pliocene. Monte Cristo

Platanus dissecta, Lesq.; Chalk Bluffs, Nevada County; Table Tunnel, Plumas County in the Miocene.

BALSAMIFLUAE.

Liquidamber (Sweet Gum).

Liquidamber californicum, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

URTICACEAE.

Ulmus (Elm).

Ulmus californica, Lesq.; Nevada and Tuolumne Counties; Pliocene.

Ulmus affnis, Lesq.; Table Mountain, Tuolumne County; Pliocene.

Ulmus pseudo-fulva, Lesq.; Nevada County; Pliocene.

Ficus (Fig.).

Ficus asiminaefolia, Lesq.; Rock Corral, Placer County;

Ficus appendiculata, Heer; Lassen County; Pliocene.

Ficus sordida, Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Ficus tiliaefolia, Al Brogniart; Forest City, Sierra County, California; Nevada County, Cal.; Wyoming; Colorado; Dakota; Europe; Pliocene; Miocene; Eocene.

LAURINEAE.

Laurus (Laurel).

Laurus californica, Lesq.; San Joaquin and Plumas Counties; Miocene. (Not the living so-called "California Laurel," which is an Oreodaphne.)

Laurus furstenbergi, Al. Brogniart; Corral Hollow, San Joaquin County; Miocene.

Laurus grandis, Les.; Corral Hollow, San Joaquin County; Miocene.

Laurus princeps, Heer; Corral Hollow, San Joaquin County; Miocene. Also found in Europe.

Laurus resurgens, Saporta; Corral Hollow, San Joaquin County, California; Montana; Miocene.

Laurus salicifolia, Lesq.; Corral Hollow, San Joaquin County; Miocene.

Laurus socialis, Lesq.; Lassen County, California; Wyoming; Miocene.

Persea (Ahuacata—"Alligator Pear").

Persea dolleri, Lesq.; Shasta County; Miocene.

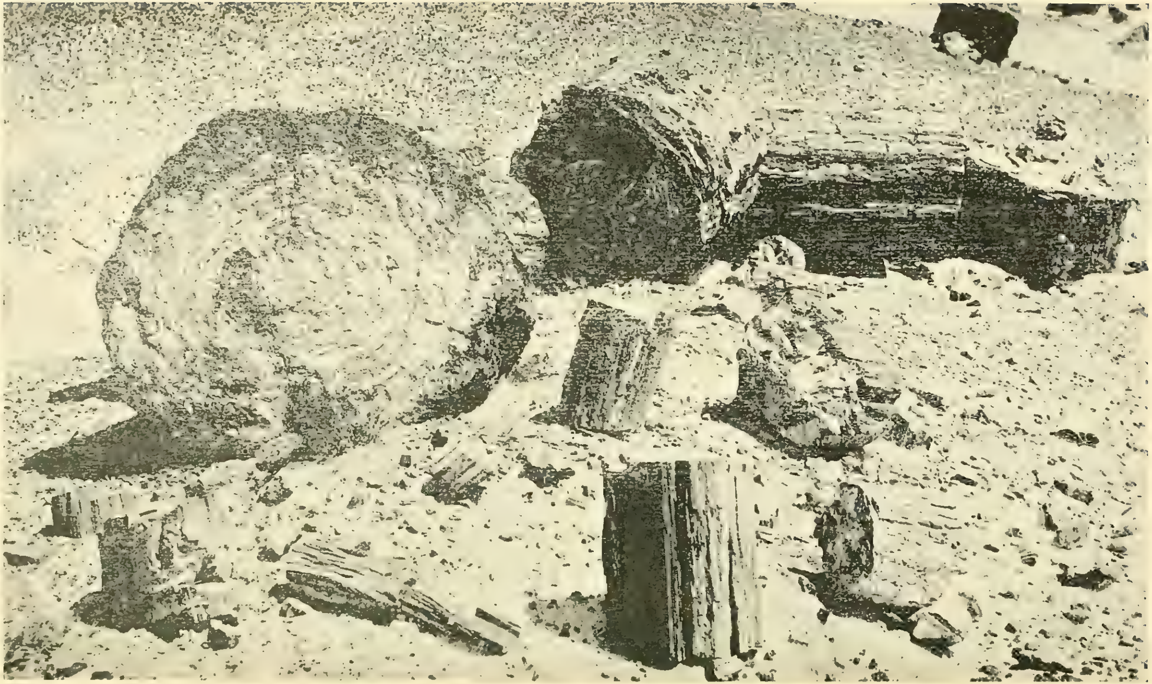

PLATE IV.—PETRIFIED TREE—"FOREST and WATER"
Courtesy of the Author, Abbot Kinney.

Persea pseudo-carolinensis, Lesq.; Alameda County; Miocene.
Persea punctulata, Lesq.; Corral Hollow, Alameda County; Miocene.

Oreodaphne (Mountain Laurel).

Oreodaphne heeri, Gaudichauo; Lassen County; Miocene.
Oreodaphne litseaeformis, Lesq.; Lassen County; Miocene.

Cinnamomum (Cinnamon).

Cinnamomum affine, Lesq.; Corral Hollow, San Joaquin County; Miocene. Also found in Colorado, Wyoming and Europe.
Cinnamomum scheuchzeri, Heer; Lassen County; Miocene. Wyoming and Europe.

It will be seen that the species of this exclusively tropical genus of plants are widely distributed, and suggest a warm climate. It includes about fifty living species ranging on both sides of the equator.

SAPINDACEAE (Aceraceae).

Acer (Maple).

Acer aequidentatum, Lesq.; Chalk Bluffs, Nevada County; Pliocene. Found also in Colorado and Greenland.*
Acer arcticum, Heer; Chalk Bluffs, Nevada County; Forest City, Sierra County; The Bad Lands of Nebraska; Alaska and the Arctic Zone; Pliocene and Miocene.
Acer bendirei, Lesq.; Monte Cristo Tunnel, Spanish Peak, Plumas County; Miocene.
Acer bolanderi, Lesq.; Table Mountain, Tuolumne County; Pliocene.

To be continued.

HYMENOPTERA OF SOUTHERN CALIFORNIA, II.

BY T. D. A. COCKERELL.

Megachile occidentalis, Fox, var. *leucotricha,* n. var.

MALE.—Length, 14 mm., black, with a rather long, parallel sided abdomen. Head broad, facial quadrangle almost square; checks swollen with white hair, long and dense beneath; vertex broad, shining, with strong well-separated punctures, and rather thinly clothed with erect black hair; face densely clothed with erect white hair, up to the region of the antennæ, where it gives way to black; clypeus densely punctured, with a median impunctate band; antennæ long and slender, flagellum dull ferruginous beneath, last joint scarcely or not enlarged; mandibles massive, sharply pointed, the lower edge produced into a large

* The fact that fossil plants of widely different latitudes are found in the same region may be accounted for by the differences of altitude in the same region where the plants grew, and also from the species having been alternately driven North and South by the climatic changes resulting from tropical heat and glacial cold.

triangular tooth, the outer edge of which is densely clothed with short orange hair; mesothorax strongly and very densely punctured, thinly clothed with erect hair, some of which is black or blackish; no band of dense hair between mesothorax and scutellum; sides and under part of thorax with dense white hair; tegulæ dark brown, closely punctured; wings hyaline, dusky at apex; anterior coxal spines short; legs with abundant white hair; hair on inner (or anterior) side of tarsi light orange; anterior tarsi nearly simple, but first joint laterally dilated and angularly produced on the inner side; second joint slightly dilated; these joints densely fringed with white hair on the inner side; second joint with a black spot, (due to local absence of pubescence) at the base of the white fringe on the inner side; the orange hair on the anterior tarsi is wholy on the anterior margin; at the apex of each of the first two joints of the middle tarsi is a little comb of three reddish-orange spines; abdomen strongly punctured, not obviously banded, but the hind margins of the segments have lateral white hair-bands; and the third, fourth and fifth segments have bands of white pubescence (best developed on the fifth) at the base of the normally exposed (punctured) part; ventral surface of abdomen, especially towards the base, with much white hair; apical dorsal segment very black, with short black hair, its end deeply notched, the edges of the notch rounded; its extreme lateral margins with a sharp tooth, curved backwards and shaped like a rose-thorn; lateral plates of genitalia triangular.

Hab.—Near Los Angeles; and Switzer's Camp (about 12 miles from Pasadena, in the San Gabriel Mts) Two males collected by Dr. A. Davidson.

The entire black legs readily distinguish it from typical *M. occidentalis*, the type locality of which is Las Cruces, New Mexico,

Megachile fidelis, Cresson.

Near Los Angeles, both sexes, (Dr. A. Davidson).

Megachile angelarum,, Ckll.

An additional specimen is from Rock Creek, Mojave Desert, (Dr. A. Davidson).

Megachile frugalis, Cresson.

A male from Dr. Davidson, Mt. Disappointment, San Gabriel Mts. This species has hitherto been known from Texas.

Megachile manifesta, Cresson.

A pair from Dr. Davidson, collected at Banning, Riverside Co., offer some differences from the Rocky Mountain form of the species, and should probably be recognized as a distinct geographical race.

Chelostoma australis, n. sp.

FEMALE.—Length about 9 mm., black; head and thorax, strongly and densely punctured; white pubescence at sides of thorax, on postscutellum, cheeks and sides of face especially, that on sides of face forming conspicuous bands; antennæ short, flagellum faintly ferruginous towards end; anterior edge of clypeus with a median stout snout-like projection, keeled above; mandibles large, bidentate; tegulæ very dark-brown; wings hyaline, nervures and stigma black; legs black, the hind femora large and bright ferruginous, the inner side of the hind tibiæ also bright ferruginous; base of metathorax with a short longitudinally striate area; abdomen shining, strongly but only moderately densely punctured; first two segments more or less ferruginous laterally; ventral scopa white.

Hab.—Near Los Angeles, (Dr. A. Davidson). Related to *Chelostoma rubifloris* (Ckll., Can. Ent.. 1898, p. 50, as *Chelynia rubifloris,)* but easily distinguished by the color of the legs.

Alcidamea uvulalis, n. sp.

MALE.—Length about 10 mm., black, with white pubescence, dense on face and thorax; on abdomen forming narrow bands on the apical margins of segments 1 to 4, and less distinctly on 5. Head ordinary; eyes greenish; mandibles black; antennæ with the scape greatly swollen, punctured; flagellum broad, dark ferruginous, crenulated above, apical joint pointed; vertex and mesothorax densely punctured; tegulæ black; wings yellowish; abdomen closely punctured; second ventral segment produced into an immense uvula-like projection; third ventral segment emarginate in the middle; sixth dorsal segment produced into a sharp point at each extreme side; apical segment projecting, ending in a point which is laterally flattened.

Hab—Lancaster, Mojave Desert, (Dr. A. Davidson.) A very distinct species.

Heriades odontura, n. sp.

MALE.—Length about 9 mm., black, narrow in form; head rounded; cheeks with white hair; face and front very densely punctured; flagellum slightly ferruginous beneath, last joint subtruncate; thorax densely punctured; parapsidal grooves distinct; pleura with short white hair; tegulæ shining, piceous, with a large ferruginous spot; wings strongly ferruginous; legs entirely black; abdomen closely punctured, with narrow white hair-bands on apical margins of segments 1 to 4; second ventral segment produced into a blunt eminence; apical segment ending in three points or teeth, the middle one having at its base a circular depression full of ochreous pubescence.

Hab.—Near Los Angeles, Calif., (Dr. A. Davidson). The male of *Heriades* differ in the structure of the apex of the abdomen. Thus *H. florisomnois* (L.) has two truncate processes; *H. campanularum* (Kirby) has two long pointed processes; *H. nigricornis*, Nyl. has the end of the abdomen broadly truncate, without process; *H. Odontura*, n. sp., has three processes.

Halictoides davidsoni, n. sp.

MALE.—Length 10 mm., slender; black, vertex with a bluish, mesothorax with a greenish tint; head and thorax clothed, not very densely, with long erect hairs, white on cheeks and pleura (very long on cheeks beneath), greyish and blackish on thorax above, black at sides of face; clypeus densely covered with long white hairs; scape slightly swollen, clothed with long black hairs; flagellum long faintly tinged with ferruginous beneath, head broad, eyes prominent; mandibles thickened about the middle, black, ending in two bright ferruginous teeth, the lower one much the longest; from the lower side of each mandible near the middle proceeds a very long curled tuft of pale orange hair; mesathorax with large close punctures, basal area of metathorax well-defined, strongly longitudinally striated; tegulæ shining very dark-brown; wings yellowish, nervures and stigma piceous; legs ordinary, black, with long white hair, middle femora swollen; abdomen narrow, closely punctured, clothed with short erect dull white hair; extreme apex ferruginous; apical vental segment terminating in two sharp teeth; vental surface shining, with very little hair.

Hab.—One from Dr. A. Davidson, from Bear Valley, San Gabriel Mts. Closely allied to *H. mulleri*, Ckll., 1898, which was described from a female. It seems hardly likely that *H. davidsoni* is the male of *mulleri*, as the latter has the first recurrent nervure entering the second submarginal cell very near its base, whereas in *H. davidsoni* it enters a considerable distance from the base as in *H. marginatus*.

Halictoides (Epihalictoides) virgatus, Ckll., 1898. Southern California. The following notes, based on cotypes; are additional to my original description.

MALE.—Abdomen tufted beneath at apex; fourth ventral segment at sides of hind margin tuberculate.

FEMALE.—Blade of maxilla 700 (this and the palpal measurements are all in micromillimeters); joints af palpi minutely scaly; length of palpal joints, (A.) Labial palpi, (1) 380, (2) 340, (3) 220, (4) 190; (B.) Maxillary palpi, (1) 270, (2) 310, (3) 260, (4) 210, (5) 210, (6) 200.

Pentstemon Parishii, a hybrid

BY A. DAVIDSON, M. D.

In May of this season in an excursion to the foothills Messers Braunton, Greata and Johnston at Glendora, and Dr. Kraemer and the writer at Azusa, gathered some specimens of Pentstemon that were new to the county and somewhat unfamiliar. Mr. Parish to whom the specimens were referred named them *P. Parishii*

The plants were compared and discussed at a subsequent meeting, and the evidence seemed conclusive in favor of this plant being a hybrid between *P. centranthifolius*, Benth, and *P. spectabilis*, Thurb.

In color *P. Parishii* varies from a livid purple to a bright red. The leaves are entire, or occasionally denticulate and clasping at the base. In *centranthifolius* they are entire and scarcely clasping, while in *spectabilis* they are spinulose denticulate and connate. The inflorescence is intermediate in shape between the virgate raceme of the one and the expanded thyrsus of the other. The flowers are less ventricose than those of *spectabilis* and more dilated than those of *centranthifolius*. The description given in Gray's Snop. Fl. though accurate might with advantage be more detailed. The sterile flaments in our specimens were not hooked.

Since the above was written Mr. Hall's work on the Flora of San Jacinto has appeared and I find that he likewise considers *P. Parishii* a hybrid. This is a new addition to our published county list. Wallace I believe found it in the neighborhood of Los Angeles long ago but whether the locality was within the present county boundaries I have no means of ascertaining.

A Botanical Survey of San Jacinto Mountain—Harvey Monroe Hall.

[Pages 140. Plate 14. University Press, Berkeley, 1902.]

The botanical publications of the University of California have begun most auspiciously with Mr. Hall's careful study of the pine belt of San Jacinto Mountain. The southernmost lofty summit of the Sierra Nevada rises from a desert base of but 500 feet above sea level with precipitous abruptness to an Alpine height of nearly 11,000 feet; to the south and west dominating the rugged convolutions that separate it from the sea. San Jacinto occupies a position which gives its flora a peculiar interest. To a statement of the conditions thus presented, and to the working out in detail of the resultant problems, Mr. Hall has devoted his first fifty-two

pages. The narrow limits into which the different life-zones are compressed in these southern mountains, renders accurate delimitation a perplexing task, not to be accomplished without thorough field study; but for San Jacinto this task has now been performed most successfully. The flora of no other like area in the state has received so complete elucidation.

The remaining pages are occupied by a catalogue of the Spermatophytes growing in the pine belt. These number 456 species and varieties, all but one having been collected by Mr. Hall. The following plants are here for the first time reported from Southern California:

Panicum thermale, Bolander; *Phleum alpinum*, L.; *Poa alpina*, L.; *P Buckleyana*, Nash; *Trisetum nutkaense*, S. & M.; *Carex Hallii*, Bailey; *C. nudata*, Boott; *C. Preslii*, Steud.; *Listera convallarioides*, Torr.; *Potentilla lactea*, Greene. Mr. Hall also finds *Sambucus Mexicana*, Presl., a species whose presence in Southern California has been questioned. He also refer to *Pinus flexilis*, James, the white-barked pine of our higher mountains, heretofore regarded as *P. albicaulis*, Engelm. The new species proposed are *Bromus Porteri assimilis*, Davy; *Elymus Parishii*, Davy and Merrill; *Poa Howellii Chandleri*, Davy; *Stipa californica*, Merrill and Davy; *Oxytheca marginata*, Hall; an elegant little plant; *Potentilla acuminata*, Hall; *P. callida*, Hall; *Monardella macrantha* vars. *pinetorum* and *arida*, Hall; *Erigeron Jacinteus*, Hall; and *Hulsea vestita callicarpha*, Hall.

S. B. P.

RECENT LITERATURE.

Three new species of *Chromodoris* by T. D. A. Cockerell, *Nautilis*, Vol. 16:2. Discovered at La Jolla and San Diego, Cal.

Trees of Southern California by Prof. W. R. Dudley. Stanford. Art. III. "The timber belt and the high Sierras" with a key to the species. *Los Angeles Saturday Post*. Vol. 6:2.

Within the limits of the forest reserve and 10 miles from the General Grant National Park has grown the largest Sequoia yet discovered. This monster which was measured by John Muir has a diameter of 32 ft. *L. A. Times, Aug. 27th, 1902*.

Those interested in the habits of the Aboriginal Indians will find Mr. Chestnuts "Plants used by the Indians of Medocino County" a mine of interesting facts. The food and medicinal plants used by the Indians are enumerated as well as the methods whereby they are rendered available for use. The Indians has so modified his old habits that this is probably the last work of the kind that can be written from direct observation.

"The thirteenth annual report of the Missouri Garden" is practically a Monograph on the Yucceæ, by Dr. Trealease. Coming from the pen of a specialist the work is a most desirable one and its value is very much enhanced by 99 plates illustrating every known species, with maps showing their distribution in N. America. The author has considerably modified the nomenclature previously adopted by himself and other botanist. Our Western species as amended now are *Hesperoyucca Whipplei*, *Clistoyucca arborescens*, *Yucca Mohavensis*. To the southern species many new varieties have been added and a new Genus *Samuela* has with two species has been added to include the gamphyllous forms. The variety *graminifolia* of *H. Whipplei* is not endorsed though it appears to the writer to be desiring of at least varietal rank.

Through the effort of Mr. Braunton the first accurate catalogue of our ornamental shrubs and plants has just been issued by the Sycamore Grove Nurseries. As a short description accompanies each species, it becomes a useful handbook.

PUBLICATIONS RECEIVED.

Utilizing our water supply," by A. J. McClatchie. Bull. No. 43. Agric. Exper. Stat. University Arizona.

"Triassic Ichthyopterygia from California and Nevada", by J. C. Merriam. Geology, Vol. 3, No. 4. University California.

"The Root-tubercules of Bur Clover and of some other Leguminous Plants," by G. J. Pierce. Botany, Vol. 2, No. 10. Proc. Cal. Acad. Science.

"Lands of the Colorado Delta in the Salton Basin." Bull. No. 140 with Supplement. Agric. Exper. Stat. University California.

"Plants used by the Indians of Mendocino County, Cal.," by V. K. Chesnut. Vol. 7, No. 3. Botany, U. S. Dept. Agriculture.

"Missouri Botanic Garden," Thirteenth Annual Report.

"Experimental Station Record." Vol. 13, No. 9. U.S. Dept. Agricult.

"Experiments with Deciduous Fruits at or near the Southern coast range sub-station Paso Robles, from 1889 to 1902," by C. H. Shinn. Bulletin No. 141. Univ. Cal., Agricult. Exper. Stat.

"A working plan for Southern hardwoods and its results," by J. Foley. Reprint Yearbook Dept. Agric. 1901.

"Grazing in the Forest Reserves," by F. Roth. Reprint Yearbook Dept. Agric. 1901.

"Some Insects injurious to Vegetable Crops." Bulletin No. 33. Entomology, U. S. Dept. Agricult.

"Principal Insects liable to be disturbed on Nursery Stock. Bulletin No. 34. Entomology, U. S. Dept. Agricult.

"Weeds in general:" Two new comers into Pennsylvania. The Pennsylvania State College Agric. Exper. Stat. Bulletin No. 58.

"The action of copper on leaves." A physiological investigation. Bulletin Agricult. Exper. Stat. Uuiv. Tennessee. Vol. XV, No. 2.

"Annual Archæological Report," Ontario, 1901. Presented by Mr. J. H. Hume, F. R. S.

"The fog fruit or Lippia nodiflora as an economic plant." Timely Hints for farmers. No. 31. Agricult. Exper. Station, Univ. Arizona.

"Irrigation at the Station Farm." Bulletin No. 41. Agricult. Exper. Stat. Univ. Arizona.

"The cool side of a house in Arizona." Bulletin No. 42. Agricult. Exper. Stat. Univ. Arizona.

"Mycological Notes," by C. G. Lloyd, No. 9, Cincinnati, O.

"The Geastræ," illustrated with 80 figures by C. G. Lloyd.

"Bulletin of the Lloyd Library of Botany Pharmacy and Materia Medica," Lloyd Bros., Cincinnati, O. No. 5, Mycological Series No. 2.

"Reference to Capillarity to the end of the year 1900." Bulletin of the Lloyd Library. Bulletin No. 4. Pharmacy Series No. 1.

"A Flora of the South Fork of Kings River, from Millwood to the head waters of Bubbs Creek," by Alice Eastwood. Publications of the Sierra Club, No 27.

"New Species from the Sierra Nevada Mountains of California," by Alice Eastwood. Proc. Cal. Acad. Science, Botany, Vol. 2, No. 9.

Notes.

Up to July I, Phœnix showed 175 degrees of heat in excess of the normal, yet the effect on the staff of the Agricultural Experiment Station seems to have been decidedly stimulating. No less than four Bulletins (see "Publications Received") have been issued from that station in less than a month. In one *Lippia nodiflora*, in use in dry localities as a substitute for grass in lawns, is recommended as a soil binder in soils liable to wash or on banks of irrigating ditches. The result of "Irrigation at the Station Farm," and "Utilizing our water supply" at the farm is ably set forth by Prof. McClatchie and the encouraging results attained commend the pamphlets to every California farmer. All dwellers in the warmer districts of the south-west will find in "The cool side of a house in Arizona" the best method of building and the scientific reasons therefor.

F. P. Brackett, Professor of Mathematics in Pomona College has a leave of absence for the coming School year. He will spend the year in study and investigation at Clarke University, Worcester, Mass , where he is the recipient of an honorary fellowship. The following summer he expects to spend at Yerkes Observatory in Spectroscopic investigation.

Transactions.

GEOLOGICAL SECTION.

Los Angeles, Cal., October 27th, 1902.

The Geological Section met at the Woman's Club Rooms at 8 p. m. Chairman Geo. W. Parsons called the meeting to order. Minutes of previous meetings read, corrected and approved. The Chairman introduced Mr. David C Cunningham as the speaker of the evening, who gave a very interesting description of Chile, its climate, geology and topography.

He stated in parts, that the natural advantages of Chile would include all the marvels of California, Colorado, Arizona, Nevada, Oregon and Alaska, as to climate, minerals, desert, forests, agriculture, mountains, rivers and lakes, while its climate ranges all the way from tropic to arctic, with the same variation of rainfall.

A portion of the interior having fertile plains furnishing wheat, cattle and fruits for the less tropical regions in the North. The speaker gave a thorough description of its mines and mineral formations, its nitrate and borax deposits, some of which were located at an elevation of 12,000 feet above sea level.

In regard to earthquakes, there they realize the genuine article, which was frequently accompanied with tidal waves which were occasionally very destructive. His description of a trip of 17,200 feet of an altitude up the mountains was full of interest. He also gave a description of the Birds and Animals indigenous to the section,

G. Major Taber, *Sec'y.*

BOTANICAL SECTION.

The Section met at 501 Laughlin Block on November 18th. Mr. Johnston in the chair. The evening was devoted to the examination of our native live-oaks, herbarium specimens of which were shown.

Mr. C. Russell was elected Secretary for the ensuing year.

C. Russell, Secretary.

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BULLETIN
OF THE
Southern California Academy of Sciences

VOL. 2. LOS ANGELES, CAL., JANUARY 1, 1903. NO. 1
231 West First Street.

PREHISTORIC CALIFORNIA.

(Continued from December BULLETIN)

BY DR. LORENZO GORDIN YATES.

Acer sextianum Saporta; Chalk Bluffs, Nevada County; Pliocene and Miocene, and in the Miocene of France.

MYRTUS—Myrtle.

Mytrus oregonensis Lesq.; Corral Hollow, San Joaquin County; Miocene.

LONICEREAE—Caprifoliaceæ.

Viburnum.

Viburnum whymperi Heer: Shasta County; Miocene, Related to the Laurestinus.

SAPOTACEAE.

Diospyros—Persimmon.

Diospyros virginiana turneri Lesq.; Contra Costa County; Miocene.

ARALIACEAE.

Aralia—Spikenard.

Aralia acerifolia Lesq.; Chalk Bluffs, Nevada County; Pliocene and Miocene.—Nebraska.

Aralia angustiloba Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Aralia lasseniana Lesq.; Lassen County; Miocene.

Aralia whitneyi Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Aralia zaddachi Heer; Chalk Bluffs, Nevada County; Pliocene and Miocene.

CORNEAE.

Cornus—Dogwood.

Cornus hyperborea Heer; Lassen County; Miocene.—Arctic Zone.

The many groves of "Big Trees" are among the wonders of California. The trees were first discovered by some miners, who in prospecting first came upon what is known as the Calaveras grove. Later the Mariposa and Fresno groups were discovered. Then Professor William H. Brewer made known the existence of extensive forests of "Big Trees" along the flanks of the Sierra Nevada Mountains. In these groves there are many trees from 275 to 376 feet in height, and from 25 to [illegible] feet in diameter. Some of the largest that have been felled indicate an age of [illegible] to 2500 years.

Cornus kelloggii Lesq.; Chalk Bluffs, Nevada County; Pliocene.
Cornus ovalis Lesq.; Table Mountain, Tuolumne County; Pliocene.

MAGNOLIACEAE.

Magnolia.

Magnolia californica Lesq.; Chalk Bluffs, Nevada County; Lassen County; Contra Costa County; Pliocene and Miocene.
Magnolia inglefieldi Heer; Lassen County; Miocene.
Magnolia lanceolata Lesq.; Chalk Bluffs, Nevada County; Forest City, Sierra County; Pliocene.

ILICEAE (Aquifoliaceæ).

Ilex—Holly.

Ilex prunifolia Lesq.; Table Mountain, Tuolumne County; Pliocene.

RHAMNAEAE.

Zizyphus—Lotus Tree.

Zizyphus microphyllus Lesq.; Chalk Bluffs, Nevada County; Pliocene.
Zizyphus piperoides Lesq.; Chalk Bluffs, Nevada County; Pliocene.

JUGLANDEAE.

Juglans—Walnut.

Juglans californica Lesq.; Chalk Bluffs, Nevada County; Pliocene. Not the same as the living species of that name, but the fossil has the priority.
Juglans debeyana Heer; Rock Corral, Placer County; Cretaceous or Eocene.
Juglans laurinea Lesq.; Chalk Bluffs, Nevada County; Pliocene.
Juglans oregoniana Lesq.; Oregon; Chalk Bluffs, Nevada County, Cal.; Pliocene and Miocene.
Juglans rugosa Lesq.; Lassen County; Miocene. Also Wyoming; Montana.

HICKOREAE.

Carya—Hickory.

Carya bilinica Unger; Monte Cristo Tunnel, Plumas County; Miocene.

STERCULIACEAE.

Pterospermites.

Pterospermites spectabilis Heer; Spanish Peak, Plumas County; Miocene.

ANACARDIACEAE.

Rhus—Sumach.

Rhus boweniana Lesq.; Table Mountain, Tuolumne County; Pliocene.

Rhus dispersa Lesq.; Table Mountain, Tuolumne County; Pliocene.

Rhus heufleri Heer; Corral Hollow, Alameda County; Miocene.

Rhus metopioides Lesq.; Table Mountain, Tuolumne County; Pliocene.

Rhus mixta Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Rhus myricaefolia Lesq.; Chalk Bluffs, Nevada County; Pliocene.

Rhus typhinoides Lesq.; Table Mountain, Tuolumne County; Pliocene.

ZANTHOXILEAE.

Zanthoxylon.

Zanthoxylon. diversifolium Lesq.; Nevada County; Pliocene.

ROSAFLOREAE.

Cercocarpus.

Cercocarpus antiquus Lesq.; Table Mountain, Tuolumne County; Pliocene.

LEGUMINOSAE.

Colutea—Bladder-senna.

Colutea boweniana Lesq.; Nevada County; Miocene.

In addition to the above named extinct species, a large proportion of the plants composing our present flora may be properly considered as, in a measure, prehistoric, for the reason that the majority of them appeared previous to, or about the time of the advent of man.

California possesses living trees which connect us more closely with prehistoric times than can be claimed by any other region of country on the earth. These have come down to us as living records of an epoch so far distant from the present that, since they germinated and commenced their growth, every other species of the land plants, and the entire mammalian fauna of that epoch have become extinct, and their places occupied by new, and in many instances, widely different species.

These "Big Trees" of California open up views and give vivid impressions of the past such as no other living thing can equal, and although their exact ages have not been definitely proven, there seems to be no doubt that some of the individuals now growing on the western slopes of our Sierras are from two to three, or perhaps four, thousand years old. Could these grand old Giants of the Forest portray the changes they have witnessed in their lifetime, what grand and fascinating stories they could tell!

Prof. C. S. Sargent, in his "Sylva of North America," says of them: "The average height of *Sequoia Wellingtoniana* is about 275 feet, and its trunk diameter near the ground 20 feet, although individuals from 300 to 320 feet tall, with trunks from

Part of one of the "Big Trees" (Sequoia gigantea) of the Mariposa grove in the Sierra Nevada Mountains. The Sequoias rank among the most remarkable trees known to man. They grow to incredible heights, straight, tall and columnar, with short and densely spreading branches. The bark near the ground is from one to two feet thick. A specimen measured in August, 1902, by Professor Muir, was found to be 108 feet in circumference one foot above the ground. The massive, fluted trunk, straight, strong and adamant as a pillar, was free of branches to a height of 175 feet, where its diameter was eleven feet.

25 to 30 feet thick, are not rare. During four or five centuries the tapering stem is clothed with slender, crowded branches, which are erect above and horizontal near the middle of the tree, and below sweep toward the ground in graceful curves, thus forming a dense, narrow, strict pyramid. Gradually the lower branches disappear, and those at the top of the tree lose their aspiring habit; the trunk, which is much enlarged and buttressed at the base, and fluted with broad, low, rounded ridges, becomes naked for 100 or 150 feet; and the narrow, rounded crown of short, horizontal branches loses its regularity, and gains picturesqueness from the eccentric development of some of the branches or the destruction of others."

The "Report on the Big Trees of California," issued by the Division of Forestry of the U. S. Department of Agriculture in 1900, introduces the subject as follows: Before the glacial period the genus of big trees called Sequoia flourished widely in the temperate zones of three continents. There were many species, and Europe, Asia, and America had each its share. But when the ice fields moved down out of the north the luxuriant vegetation of the age declined, and with it these multitudes of trees. One after another the different kinds gave way, their remains became buried, and when the ice receded just two species, the Big Tree and Redwood, survived. Both grew in California, separate from the other, and each occupying, in comparison with its former territory, a mere island of space. As we know them now, the Redwood (*Sequoia sempervirens*) lives only in a strip of the coast ranges 10 to 30 miles wide, extending from just within the southern border of Oregon to the Bay of Monterey, while the Big Tree (*Sequoia washingtoniana*) is found only in small groves scattered along the west slope of the Sierra Nevada Mountains, from the middle fork of the American River to the head of Deer Creek, a distance of 260 miles.

The utmost search reveals but ten main groups, and the total number of good-sized trees in these groups must be limited to a few thousand. It is, moreover, the plain truth that all the specimens which are remarkable for their size do not exceed 500.

The Big Trees are unique in the world—the grandest, the largest, the oldest, the most majestically graceful of trees—and if it were not enough to be all this, they are among the scantiest of known tree species, and have the extreme scientific value of being the best living representatives of a former geologic age. It is a tree which has come down to us through the vicissitudes of many centuries solely because of its superb qualifications. Its bark is often two feet thick and almost non-combustible. The oldest specimens felled are still sound at the heart, and fungus is an enemy unknown to it. Yet with all these means of

maintenance the Big Trees have apparently not increased their range since the glacial epoch. They have only just managed to hold their own on the little strip of country where the climate is locally favorable."

It will be seen by the foregoing list that the extinct flora of California is almost exclusively Miocene and Pliocene, with an occasional species from older formations. This might reasonably be expected when we consider the comparatively recent period of the appearance of California above the ocean.

While California formed a part of a bed of the Pacific Ocean and supported innumerable forms of marine life, large areas east and north of it were clothed with extensive forests, which furnished shelter and food for the many genera and species of strange vertebrate animals not found in our own strata.

From the recognized affinity between the flora of North America and that of the Arctic Regions, it is inferred that our floras, both fossil and living, had their origin in the North, and from there the forms have been gradually distributed southward. This will account for the fact that a large number of species are common to Greenland and North America; and also accounts for the identity or great similarity of vegetable forms of the above named regions with those of China and Japan. The affinities of the present flora, with those of the middle and later Tertiary are unmistakable, although many of the living genera have not been discovered in a fossil state, and may have been of more recent origin, or later introduction. Many of the fossil forms are not represented here in the living species, but their representatives are now found in distant parts of the world under different climatic conditions from those of the California of today.

THE FAUNA OF PREHISTORIC CALIFORNIA.

Having outlined the geological vicissitudes which brought about and dominated the geography of California from the dawn of the Cretaceous Period, or "Reptilian Age," down to the time when the earth was prepared for man's occupancy, it will be necessary to return to our former starting point, in order to outline the introduction and succession of animal life in California, and as the Vertebrates are the dominant and most important of the sub-kingdoms, we will give them the most attention.

The Invertebrates, however, being the oldest and most persistent, serve as important, and in fact, indispensable aids in determining the geological formations, and their relations to the order of succession of animal and vegetable life through the ages.

Vertebrates are much more susceptible than invertebrates

to changes of their surroundings, and consequently more subject to modification of form and eventual extinction from enforced migration to unfavorable environment and conditions.

These unfavorable conditions may result from great climatic changes caused by oscillations of the earth's surface, or other cosmic disturbances, which drive out or exterminate the indigenous plants and animals upon which these vertebrates were previously dependent for their sustenance.

The capacity for migration, however, tends to the survival of these species that possessed it, for "Organisms which are incapable of moving from place to place in search of food, or of migration to escape vicissitudes of temperature, are much more completely subject to influences of their environment than those that are capable of such movement."

When, through change of level of the earth's surface, drought has overtaken a region, animals capable of the necessary migrations have escaped. When an irruption of destructive animal enemies has threatened an animal population with death, those members of it whose strength or speed insured them safety, were the survivors."*

When we consider the effects of the vast changes in the physiography of the earth described in our former chapter, and the danger from other animals, we can realize something of the terrific struggle for survival among the prehistoric land animals.

The effects of these causes are much less perceptible in the case of marine animals, either vertebrate or invertebrate. Hence we find mollusks, crustaceans, radiates, and the lower forms of animal life much more persistent, many of the genera having come down to us in an unbroken life almost from the first appearance of animal life.

The Nautilidæ, or Nautilus family, during the Silurian Age, shone with all their lustre, and presented the most varied forms; likewise many other families of the Mollusca have come down to us from the same.

All the genera of mollusks are not equally plastic, nor modified by time, the Naticas, Arcas, Nuculas, Chitons, Nautilus, etc., have lived during a longer period than have the great majority of other forms of animal life, and the extinct forms more or less closely resemble the living ones.

Reptiles and Mammals do not possess the same resistance to modification, and to this absence of plasticity in the Mollusca is due the fact that, while the mollusks persist through many geological ages, the Vertebrates are so subject to change by circumstances that the thinnest stratigraphical horizons can be characterized, from the comparative rapidity of the changes in

* "Origin of the Fittest," by Prof. E. D. Cope, New York, 1887.

the forms of vertebrate life. We look to the mollusca for evidences of the contemporaneous age of the strata of widely separated localities, and the continuity of specific and generic forms through countless ages.

Any attempt to trace the animal life of a region can be likened to the "roll-call of an army after a series of hard-fought battles, when only a few scarred and crippled veterans remain to answer to their names." Or rather, it must resemble an array of ancient relics dug from some long forgotten field of combat, when no survivor remains to tell the tale of the contest.

Our only source of information is the Book of Nature, from which time and the mutability of events have blotted out or misplaced paragraphs, pages, and in some instances entire chapters, leaving the gaps to be filled by close study, analogy, inference, or the imagination.

Many of these spaces or blanks may be restored by future discoveries; we can only make the best possible use of the material at hand, trusting to future writers of perhaps later generations to make the record more nearly complete.

By laborious and long continued research the ancient strata of the earth's crust have been explored, and have yielded fossil skeletons of extinct animals which have proved to be of more value to science than rare implements or vessels of bronze or gold.

On the American Continent vertebrate life was introduced after the close of the Silurian Period, or at least no fossil remains of vertebrates have been found in the rocks of that period. During the Triassic Period vertebrates had advanced so far that the huge Dinosaurs had attained an enormous development in America, and left their fossil footprints in the rocks as their record. But it was during the Cretaceous Period that reptilian life attained its greatest development in America, when Turtles, Crocodiles and Dinosaurs abounded in the open seas and estuaries of the period. The modern sharks also appeared at that time.

The reptiles were present in immense numbers and great variety, having come down from earlier periods.

The Mosasaurs, which attained the greatest length of any known saurian, appeared then, growing to a length of from seventy to eighty feet.

Weird and terrific reptiles roamed on cretaceous land: and others sixty to seventy feet long, preyed upon the smaller habitants of the cretaceous oceans; and flying reptiles with wings expanding to a width of fifty feet navigated the air of the period.

Immense turtles, with a length of thirteen feet, and a breadth of fifteen feet between the tips of their extended flippers, inhabited the shallow cretaceous seas of our present Plains Region.

The late Professor E. D. Cope gave a list of one hundred and forty known species of reptiles from the Cretaceous of North America.

This was the era of the introduction of Birds. There were birds with the long vertebrated tails and toothed jaws of reptiles; next the Toothed Birds, entirely different from any existing order, which, instead of the horny beak characteristic of existing birds, had thin, long, slender jaws, with many sharp, conical teeth, set in sockets (Odontotornæ); others with teeth set in grooves (Odontalcæ), and finally the true birds (Ornithes) of the present time.

The Fishes advanced in their evolution from older forms, and the typical modern fishes were first introduced in the Cretaceous.

Of the Mollusks, the Oysters and allied genera, the Aviculas and Inoceramus attained to a great size, and there were immense numbers of Ammonites, Baculites and Belemnites in great variety, and of immense size. (The writer found an Ammonite in Shasta County which was over two feet in diameter).

The Ammonites died out at the close of the Cretaceous, after taking upon themselves strange forms just previous to their extinction.

These strange forms have been likened by Agassiz to death contortions—forms assumed in the attempt to adapt themselves to the new environment, and thus to attempt escape from their inevitable destiny.

With the close of the Cretaceous, the huge marine reptiles also became extinct, and their places were occupied by different forms.

The bodily upheaval of the entire western half of our continent, which abolished the great interior Cretaceous sea, resulted in a correspondingly great change in climatic conditions, and brought about an extraordinary change of life-system. This has been called "a period of rapid evolution, which characterized and accompanied the dawn of the modern history of the earth." (Le Conte).

THE AGE OF MAMMALS.

It may be remarked that no animals have been discovered which can be considered as the progenitors of the Mammals. Marsupials, which are of course Mammals, have been found in the Jurassic, and still exist in some portions of the world. There seems to be a gap in the procession of the Mammalia between the Jurassic and the Tertiary, when possibly some conditions existed on this continent which drove them to other regions, as Nature does not repeat itself, nor is the type of an organism which becomes extinct ever reproduced.

In the Tertiary Period animals and plants typical of those

of the present day were introduced or became prominent, the huge saurians and other reptiles of previous periods having disappeared, the Age of Mammals was inaugurated.

"At that time the Pacific shore-line was along the foothills of the Sierra range, and therefore the whole region occupied by the Coast ranges, and the Sacramento and San Joaquin valleys were then a sea-bottom."

The general character of the life system of animals was similar to the present; the most important differences arising from the subsequent extinction of the large mammals.

(To be Continued).

Concerning Certain Trees.

BY S. B. PARISH.

ABIES MAGNIFICA—In a recent interesting popular account of the trees of Southern California,* mention is made of the reputed presence of *Abies magnifica* in the highest parts of San Jacinto Mountain. The occurrence of this tree was hardly to be expected so far south, although not impossible; but it seemed highly improbable that, if present, it should have escaped the observation of so capable a botanist as Mr. H. M. Hall, who had so thoroughly explored San Jacinto. It appeared worth while, therefore, to investigate the report, that it might be either verified or corrected. It was found to have originated with a nonbotanical collector, who reported the finding of a small grove on the northwest side of Tahquitz Valley. Through the kindness of Mr. Abbot Kinney I have received specimens, including ripe cones, from one of these identical trees. They unmistakably belong to *A. concolor,* the common species of our mountains. *A. magnifica,* therefore, cannot be included in our silva.

PINUS TUBERCULATA—A dwarf pine, presumably of this species, is said to grow on the slopes of San Jacinto above Banning. It grows on the mountain side above the San Bernardino Valley, and there is no reason for regarding its presence on San Jacinto with suspicion. As yet, however, the report lacks the support of specimens, or the indorsement of a botanical observer.

QUERCUS WISLIZENI—It is desirable that the precise limits of this oak in Southern California should be ascertained. It is abundant along the slopes of Sierra Liebre, above Antelope Val-

ley, which it appears to have reached by way of Tejon Pass. Should its distribution follow that of other plants that have entered by the same gateway, it would be unlikely to extend beyond the Sierra Santa Monica and the neighborhood of Los Angeles and Pasadena. Mr. Abrams reports it from the latter region,† and I have a specimen collected on Mt. Lowe by Mr. Kinney. Mr. Abrams also reports having obtained it in the San Antonio, San Bernardino and Santa Ana ranges. I have been unable to detect it in the San Bernardino Mountains, and specimens from that station with which Mr. Abrams has obliged me, while indecisive, appear rather to belong to *Q. dumosa*, the common scrub oak of the region.

Fruiting specimens should be readily recognized, and it is to be hoped that our resident botanists will endeavor to collect material whereby its range may be definitely established.

QUERCUS ENGELMANNI—That a student of oaks should consider this species to have been improperly segregated from *Q. oblongifolia*, Torr., is conceivable; but that one who admits the validity of the former should find Southern California specimens which he is able to refer to the latter, is matter for astonishment, yet, in "The Oaks of the Continental Divide,‡ in which work the validity of *Q. Engelmanni* is admitted, three specimens from San Diego County are referred to *Q. oblongifolia*.

It will be difficult to convince those who have a field knowledge of the Blue Oaks of our Coast Ranges, that they are of more than one species. One of these three specimens is of my own collecting, and if it does not represent *Q. Englemanni*, that species has no existence.

SAN BERNARDINO, CAL.

Diptera from Southern California.

Some Diptera which I obtained last year have been kindly identified by Mr. D. W. Coquillett, as follows:

(1) San Pedro, Calif.: *Nausigaster unimaculata*, Towns.; *Helicobia helicis* (Towns); *Chlorops assimilis*, Macq.; *Culex pipiens*, Linn.

(2) La Jolla, Calif.: *Exorista confinis*, Fallen; *Senotainia trilineata*, V. T. Wulp.

T. D. A. COCKERELL.

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*Prof. W. R. Dudley in Los Angeles Saturday Post, June 7, 1902.
†Leroy Abrams' Bull. S. Cal. Acad., 1:89.
‡Dr. A. P. Rydberg Bull., N. Y. Bot. Gard., 1:224.

Additions to the Flora of Los Angeles County, II.

By LeRoy Abrams.

Rumex pulcher L. Inglewood about the station.

Malva pusilla Smith. Ballona creek near Mesmer.

Chimaphila Menziesii Spreng. Summit of Mt. Wilson under pines.

Arctostaphylos patula Greene. Mt. San Antonio above 8000 ft.

Cuscuta salina Engelm. Ballona Marshes growing on various marsh plants.

Allocarya trachycarpa (Gray) Greene. In moist ground near Inglewood.

Cryptanthe barbigera (Gray) Greene. Santa Monica Mts. on the north slope near Cahuenga Pass.

C. flaccida (Lehm.) Greene. Chatsworth Park on grassy hillsides.

C. leiocarpa (F. & M.) Greene. Sand dunes along the seashore between Redondo and Port Ballona.

Q. muriculata (A DC.) Greene. Mt. Wilson ranging from 3500 ft. to the summit.

Eremocarya lepida (Gray) Greene. Summit of Mt. Wilson.

Amsinckia lycopsoides Lehm. What seems to be this plant is not infrequent along the coast usually along the sand dunes. The plant is the same as the one about San Francisco which Dr. Greene calls by this name, but so far as we know no one has ascertained just what this species or *A. spectabilis* F. & M. is.

A. intermedia F. & M. The common species around Los Angeles is identical with the plants of San Francisco Bay region which go by this name.

Linanthus ciliatus (Benth) Greene. Summit of Mt. Wilson.

Nicotiana Clevlandi Gray. Frequent on the sand dunes between Port Ballona and Redondo.

Orthocarpus densiflorus Benth. In a set of plants recently sent to Stanford University herbarium by Mr. S. B. Parish was

an Orthocarpus labeled *O. purpurascens Palmeri* Gray. It belongs, hower, to the *O. densiflorus* type and we are unable to detect any material difference between it and that species. The specimens were collected near Los Angeles by L. A. Greata in April, 1899.

Plantago Bigelovii Gray. In moist ground near Inglewood.

Grindelia camporum Greene. Wiseburn.

Belpharipappus elegans (Nutt.) Greene. Big Tejunga wash.

B. hispidus Greene. Arroyo Seco and LaCanada.

Baeria chrysostoma F. & M. Port Ballona and the northern slope of the Santa Monica Mts.

B. mutica (Nutt.) Gray. Edges of sand dunes near Port Ballona.

Amblyopappus pusillus H. & A. On cliffs overhanging the sea, Port Los Angeles and between Port Ballona and Redondo.

Ptiloria pleurocarpa Greene. Common about Pomona.

STANFORD UNIVERSITY, CAL.

RECENT LITERATURE.

In the Torrey Bulletin for July, 1902, 4 new grasses are described by Lamson-Scribner and Merrill. All are Western, and two are of local interest, viz., *Elymus velutinus* from Deep Creek, San Bernardino Mts.; and *Festuca Elmeri,* from Stanford.

In the same issue Miss Eastwood describes five more new species of Nemophila.

Torreya August. *Hemizonia grandiflora,* Abrams. A new species from Crystal Springs Lake, San Mateo Co., Cal.

"Preliminary sketch of the Mohave Indians," by A. L. Kroeber. American Anthropologist, Vol. 4, No. 2.

PUBLICATIONS RECEIVED.

Experimental Station Record. U. S. Dept. Agricult. Nos. 10 and 11, Vol. 13 and Vol. 1. No. 1, Vol. 14.

Monogram of the N. American Umbelliferae, by J. N. Coulter and J. N. Rose, U. S. National Herbarium. Vol. 7, No. 1.

The Western Hemlock, by E. T. Allen, Forestry Bulletin No. 33, U. S. Dept. Agricult.

The River-irrigating Waters of Arizona—Their Characters and Effects. By R. H. Forbes. Bull. No. 44, Agric. Experiment Station, Univ. of Arizona.

Proceedings of the Fourteenth Annual Meeting of the Association of Economic Entomologists. Bull. 37, Entomology, U. S. Dept. Agricult.

Notes.

A. A. Eaton has re-named our Pacific Coast Woodwardia in the Fern Bulletin for October, 1901, 9, pp. 86-87, as *Woodwardia spinulosa.* It is said to differ from *W. radicans* in the absence of the scaly bud, and in being glandular. In the number for January, 1901 (Vol. 9, pp. 7-8), a new form of the sword-fern is described by the same writer from near Berkeley, under the name *Polystichum munitum, f. flabellatum.*

J. BURTT DAVY.

Professor Jepson of Berkeley, with a corps of assistants, is at present engaged on a Flora of Southern California. To those interested in botany such a work will be warmly welcomed. We wish it may make an early appearance.

During the summer we had the pleasure of a flying visit from Marcus E. Jones. Mr. Jones has just completed a monograph of the genus Allium, and is nearly ready to publish a monograph on the genus Astragalus. We learn from him that the Allium collected last summer at Tallac by one of the members of the Botanical Section is *A. atropurpureum;* that *Astragalus leocopsis* and *A. leucophyllus* are forms of the same species and that *leucopsis* is the better name; also that *A. fastidius* is the proper name for *A. fastidiosus,* and that the Academy's specimen of *A. Crotalariae* is *A. Pomoniensis,* rarely collected.

L. A. G.

Transactions.

MEETING OF THE BOARD OF DIRECTORS.

LOS ANGELES, CAL., Jan. 15, 1903.

The Board of Directors of the Southern California Academy of Sciences met this evening at 7:30 o'clock with President Comstock in the chair.

Those present were: Messrs. Knight, Hooker, Parsons and Whiting.

Dr. John Woodbridge was appointed Secretary, pro tem, in the absence of the regular Secretary.

The following applications for membership were received and passed upon favorably:

G. A. Bobrick — H. B. Cheney
G. H. Trevalyan — Miss Maude Cooper
Parran F. Rice — Frank W. Pierson
Dr. M. G. Crow

Bills to the extent of $91.75 were acted upon favorably.

The following committees were appointed:

Publication—Dr. Davidson, Melville Dozier, G. W. Parsons.

Finance—W. H. Knight, J. D. Hooker, Dr. J. R. Haynes.

Affiliation—B. R. Baumgardt, W. H. Knight, Dr. John Woodbridge.

Membership—C. A. Whiting, Dr. John Woodbridge, G. M. Taber.

Adjourned.

JOHN WOODBRIDGE,
Secretary, pro tem.

Meetings of the Board of Directors.

Los Angeles, Cal., Oct. 22, 1902.

A meeting of the Board of Directors was held this evening at the residence of President Comstock, who presided.

The directors present were Messrs. Comstock, Knight, Whiting, Taber, Davidson and Baumgardt.

Dr. Lorenzo C. Yates was elected to honorary membership. Mr. John B. French was elected an active member.

The President appointed a committee to act as incorporators for the Academy. The following members were appointed on the committee: Messrs. T. B. Comstock, W. H. Knight, J. D. Hooker, J. C. Nevin, Melville Dozier and H. O. Collins.

It was moved and carried that the Secretary be instructed to issue the new Constitution in pamphlet form and to incorporate a revised list of the membership in the pamphlet.

Application for the formation of a Botanical Section, in accordance with the new Constitution and By-laws, was received.

There being no further business, the meeting stood adjourned.

Los Angeles, Cal., Nov. 14, 1902.

Directors present, Messrs. Comstock, Knight, Davidson, Tabor, Kinney and Baumgardt.

Hon. W. A. Cheney was added to the committee on incorporation.

New members elected were Jessie A. Cady, Elfigo Riverall, Adolph Petter and C. H. Bailey. Adjourned. B. R. Baumgardt, *Secretary.*

Meeting of the Academy of Sciences.

Los Angeles, Cal., Nov. 3, 1902.

A meeting was held this evening at 949 South Figueroa street, with President Comstock in the chair.

The report of the Board of Directors was presented at the meeting.

A list of the active members elected by the Board was presented by the Secretary.

The lecture for the evening was by Mr. James R. Rogers, who selected for his subject, "*Scientific Relations of the United States Patent Office.*" Adjourned. B. R. Baumgardt, *Secretary.*

Los Angeles, Cal., Nov. 17, 1902.

The Biological Section of the Southern California Academy of Sciences was formally organized this evening.

Dr. T. B. Comstock, President of the Academy, occupied the chair and Mr. W. H Knight acted as Secretary, pro tem.

The following members were enrolled in the Section: Lyman Gregory, Carl H. Phinney, G. Major Taber, A. B. Ulrey, Dr. A. A. Conrey, Edith J. Claypole, Agnes M. Claypole, Dr. D. L. Tasker, B. M. Davis, T. B. Comstock, W. H. Knight, Melville Dozier, H. P. Barrows, C. A. Whiting and J. O. Hunt.

Prof. B. M. Davis was elected chairman and Prof. C. A. Whiting, Secretary.

Prof. Davis, the chairman of the Section, appointed a committee consisting of C. A. Whiting, Agnes M. Claypole, and A. B. Ulrey, to draw up and present a constitution for this Section.

Prof. Ulrey reported that he was interested in the examination of the city water supplies from a biological standpoint. He spoke of the importance of a close study of the hydra and its ability or inability to continue its life when it is turned inside out.

Dr. Agnes M. Claypole made an interesting report on the butterflies in this part of the state. One especially interesting fact was the habit of the milk-weed butterflies in hanging together in large masses during the night.

Prof. Whiting made a brief report in relation to the nervous system.

Prof. Davis read by title a paper on the Hymenoptera of California by T. D. A. Cocherell. Adjourned. C. A. Whiting, *Secretary.*

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BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION

A. DAVIDSON, C. M., M. D., Chairman

MELVILLE DOZIER G. W. PARSONS

CONTENTS:

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BULLETIN
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VOL. 2. LOS ANGELES, CAL., FEBRUARY 1, 1903. NO. 2

116 NORTH BROADWAY

PREHISTORIC CALIFORNIA.

(Continued from January BULLETIN)

BY DR. LORENZO GORDIN YATES.

After the destruction of the cretaceous sea of the interior, barriers were left or formed which caused the fresh water to cover large areas of land. These lakes in connection with a probable depression of the land in the interior, created a warm and humid climate, suitable for the growth of tropical plants, and it may be noted that, of the nearly three hundred species of tropical plants found fossil in the earlier Tertiary, a large proportion were Palms, many of them of great size. All of these with perhaps one exception (in San Diego county), have since migrated, or become extinct, as well as many others which will be referred to later on.

The huge reptiles of the Cretaceous were replaced by Crocodiles, Lizards, Snakes and Frogs, and the connecting links between the Reptiles and the Birds disappeared. Birds of all kinds appear which show a tropical character. The late Professor Cope, one of the most celebrated palæontologists of the time, described a gigantic ostrich-like bird, supposed to have been twice the size of the present ostrich.

The true mammals suddenly appeared in great numbers during the time of the formation of the oldest Eocene beds. Small marsupials are known to have existed before the Cretaceous, but now the earth fairly swarmed with true mammals.

This sudden appearance is supposed to have resulted from a great rapidity of change of organic forms, "partly caused by pressure of changed climate and partly from migration of species, and the consequent struggle for life between different geographical faunæ." (LeConte.)

A large number of species have been found fossil in the Middle Eocene; Professor O. C. Marsh found more than one hundred and fifty species of vertebrates, including some Lemurine Monkeys.

This mammalian fauna was not continuous throughout the Tertiary, but changed completely several times.

These earlier mammals combined the characters of many of the more recent forms, and the assumption of the specialized forms of today was gradual.

The Cetaceans or Whales first appeared in the Eocene, the oldest form being the Zeuglodon found in great abundance in the Eocene.

For some cause, for which no satisfactory reasons have been assigned, California had few, if any, of these Eocene Mammals; nor has the question been decided as to whether we have the Eocene deposits represented, or, whether there is a gap between the later Cretaceous and the Miocene or Middle Tertiary. Eminent geologists have different views upon the subject. At any rate the fact is apparent that, California has few, if any, fossil remains of the Eocene Mammals so abundant in other localities.

Possibly the Sierra Range formed an insurmountable barrier to the animals of the tropical interior, or, more probably it was because the Pacific shore-line skirted the base of the Sierras, and consequently there were no low-lying plains nor tropical marshes where such a fauna could thrive, nor interior sheltered valleys to accommodate their needs.

The extensive series of strata which form the mass of some of our mountains, by many scientists referred to early Eocene, are comparatively barren of fossil remains, possibly from their having been deposited at great depth below the ocean level. (See Plates 1 and 2, Prehistoric Fauna, which illustrate some of the recent fossil Mollusca upon which the theory of the Eocene age of the deposits in which they were found is based).

This period of rapid changes of form in animals seems to have developed greater intensity as it progressed, while geographical divisions in the fauna and flora became more distinct, and the advancement and retardation of characteristic generic forms in parallel lines more strongly marked.

Remarkable illustrations of the progression and retrogression, or retardment in the evolution of contemporaneous genera, their geological range and geographical distribution may be taken from discoveries in Oregon and California relative to the history of some of our living Land Snails. In 1865 the writer discovered a pulmonate gasteropod (Land Snail), which Dr. J. G. Cooper (the able zoologist of the California State Geological Survey, under Professor J. D. Whitney), to whom the shell was referred, found that it belonged to an entirely different group of shells from those known to occur on the Pacific Coast; he described a new sub-genus to which he assigned the snail, naming it Ammonitella Yatesi, and for many years its known habitat was restricted to the locality in Calaveras county, California, where it was first discovered. In or about the year 1883 some fossil shells collected by the late Professor E. D.

Cope, and by Professor Condon of Oregon, in the "John Day Region," a noted fossil locality, were submitted to Dr. R. E. C. Stearns of the Smithsonian Institution (now a resident of Los Angeles), who recognized specimens of a supposed ancestral form of the Ammonitella which he named Ammonitella Yatesi præcursor, and with these he found ancestral forms of other members of well known and widely distributed living species of the family of Helices, especially the Epiphragmophora fidelis, from which many of our recognized living species originated. This fossil form Dr. Stearns described as E. fidelis antecedens; Of the Ammonitella (also called Gonostoma Yatesi), Dr. Stearns says: "The Cope-Condon collections contain four specimens (Mus. No. 13,403) of this interesting and curious form. It is apparently the forerunner or ancestor of the living A. Yatesi described by Dr. Cooper from specimens collected by Dr. L. G. Yates in the cave at Cave City, Calaveras County, California, in 1869."* The restricted distribution of A. Yatesi and the smaller size of the recent, compared with the fossil examples, suggest obsolescence, as well as a survival of the extraordinary physical changes of the John Day Epoch."

Dr. Charles A. White in paper "On the Marine Eocene, Fresh Water Miocene, and other Fossil Mollusca of Western North America," says,† "It is so apparent, from the evidence furnished, that these fossil forms represent the living species ancestrally that one may reasonably make the same use of them, with reference to their genetic history, as if the continuity of that history were known by actual observation. These forms, whose genetic history and specific identity have so evidently been continued in unbroken lines from the John Day epoch to the present time, have endured remarkable vicissitudes of physical conditions as well as considerable geographical dispersion since Miocene time. Some of the changes which have taken place in that region since then are very remarkable.

"One of the greatest volcanic outflows which the earth has known, covering thousands of square miles with melted rock and forming the great mountains of the Cascada range, occurred in and near that region since those mollusks lived upon the borders of the John Day lake. The Glacial epoch has come and gone since then, and an immense subaerial erosion has taken place over the whole region, the extent of which one cannot comprehend without witnessing its results. Not a mammalian species or genus now exists indigenously upon the North American Continent that existed then, and all other vertebrate forms of continental life have materially changed; but living descendants of those land snails are thriving today in the same region and under the same specific forms that their remote ancestors bore."

It will be seen by comparison with the present status of

these two species that, while the Ammonitella appears to be approaching extinction as indicated by its restricted habitat, the other species found with it, especially the E. fidelis, has not only survived the "remarkable vicissitudes or physical conditions" specified, but has evolved or been modified into diverse forms which have been distributed over a large area of the Pacific Coast region, and are known under various specific names.

The immense numbers of fossil vertebrates representing a large number of species and genera, which have been found in the fresh water basins of Miocene age, are fairly bewildering and intensely interesting to the zoologist, but being mostly restricted to the regions lying East of the Sierras, and not found in California will be passed over.

One of the most interesting fossil vertebrates found in California is a unique, amphibious mammal allied to the Dugong, which was discovered by the writer some twenty-five years ago. It is very distinct from anything before discovered in this country, and puzzled the palæontologists of America until the late Professor O. C. Marsh determined its affinities and described it as the only known species of an entirely new genus. The writer discovered portions of the fossil remains of different individuals in three different localities in Alameda county, California, and the animal has not been found elsewhere, so far as known. Professor Marsh's description, and the illustration as published in the American Journal of Science, Vol. XXXV, Jan. 1888, is here reproduced. "NOTICE OF A NEW FOSSIL SIRENIAN, FROM CALIFORNIA; by O. C. Marsh.

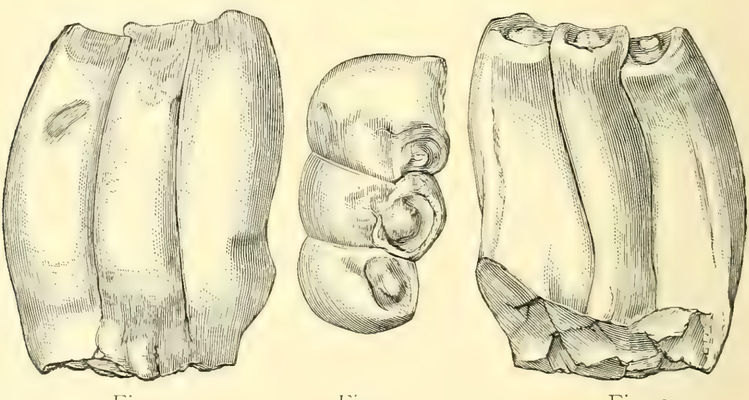

Fig. 1. Fig. 2. Fig. 3.

Fig. 1. Part of tooth of *Desmostylus hesperus*, Marsh; end view.
Fig. 2. The same specimen; seen from above.
Fig. 3. The same specimen; inner surface.
All the figures are natural size.

Desmostylus hesperus, gen. et sp. nov.

"The remains known of the present species indicate an animal about fifteen feet (m.4.5) in length, and of robust proportions. The most characteristic parts preserved are the molar teeth, which are composed of a number of vertical columns, closely pressed together, and in adult animals, firmly united at their bases. These columns are thickly invested with enamel, which is rugose externally. Inside the enamel, is a body of dentine, in which there is a central cavity. * * *

The specimen figured is apparently the posterior portion of a molar tooth. * * * * One of the best preserved specimens found with these teeth is a lumbar vertebra, which is noticeable for the extreme flatness of its articular surfaces.

"The known remains of this animal are from Alameda county, California, and are preserved in the museum of Yale College. The type specimen was found by Dr. L. G. Yates."

In many of the fragments of the teeth of the above described animal found by me the individual susps were generally well worn, some of them to one-half of their original length, and when so worn the grinding surface was always smooth, and had a slightly convex surface, so that I cannot agree with my friend, Prof. Marsh, that "Before being worn, they have their summits smooth and convex, but after some use, the center of each column presents a rounded elevation, well shown in the figures."

In the illustration, Figs. 1 and 2 show the surface of the worn portion, and Fig. 3 the outline of the worn portion on the outer edge of the tooth.

Professor Dana believed that the Cretaceous Mollusca of this Coast continued down into the earlier Tertiary, as there was no great or important convulsion to destroy them until the Middle Eocene; Thus the theoretical dividing line between the Upper or Later Cretaceous and the Lower or Earlier Tertiary was bridged over, as was suggested by Dr. J. G. Cooper, and is not apparent. The marked unconformity of the Miocene with the earlier formations show that some great changes took place about the time of the inauguration of the Miocene, or Middle Tertiary.

During the Miocene Period very little of the land we call California was above the level of the ocean, a fact which explains the absence of remains of land animals of the period, found in such abundance in Oregon, Wyoming and Utah; That portion of California lying south of the Bay of San Francisco, and from the Pacific shore to the western foot of the Sierras was an almost unbroken sea.

In a paper published by the California Academy of Sciences in 1874 Dr. Cooper says: "The fossil evidence which we possess relating to the Miocene epoch in California is, however,

abundant and interesting. It so far consists of beds of marine shells, found at short intervals throughout the Coast Range and the foothills of the Sierra Nevada," which contain the proper proportion of living species to prove their age as relatively older than the Pliocene." * * * "As the Miocene was elsewhere the culminating point for the large and strange tertiary mammals, it is altogether probable that some of them inhabited portions of the dry land of California, connected with the regions in which they were so abundant in the north; but so far the geological surveys have not been sufficient to define their limits, either in time or space, within the State."

It is possible that, in consequence of the great erosion which has taken place on the surface, some of the Miocene animal remains may have been transported from the land of the period, either by the action of water or ice, and deposited in the strata of more recent formations.

The Miocene Period in California was, however, rich in the number and variety of its mollusca, which are found in a good state of preservation. Immense beds of fossil oysters of unrivalled size, were deposited during the period, some of the shells being sixteen inches in length, and correspondingly wide; One of these beds has been found on the west shore of the Colorado Desert, at an altitude of over one thousand feet; The writer found another bed of these oysters (Ostraea Titan) near the summit between the Livermore and San Joaquin valleys; They are also found near San Luis Obispo, and in other localities.

In the center of a large concretionary boulder in the Miocene region of Alameda County, the writer discovered a well preserved specimen of a new species of Pinna, figured on Plate 4, of this Section, Fig. 53, and a description was published in the Report of the State Mining Bureau of California for 1887, p. 259. (Note—For some unexplained reason the photograph and drawing sent to the State Mining Bureau with the description, not used for the illustration, but a poor specimen found some years later, in the Pliocene of the San Joaquin Valley was used instead.)

The original type specimen is still in the writer's collection, is nearly twice the length of the specimen figured, almost perfect in outline, and retains a considerable portion of the original shell; the species was afterward found in Ventura and Kern counties, in deposits of Pliocene age.

(To be Continued).

Contributions to the Lichen-flora of the Californian Coast Islands.

BY DR. H. E. HASSE.

While the Phaenerogams of these islands have been pretty thoroughly canvassed by visiting botanists, scant notice or none has been given the lowly but interesting class of lichens, and thanks are due Mrs. Blanche Trask for having made some collections, although it is to be regretted that the matter gleaned during several trips has not been more extensive.

To make this list collective of the known insular lichens, some of the species previously reported (ERYTHEA 1895, TORREY BOT. CLUB LICH. SO. CAL. 1898), are re-entered here. Excepting species found upon Catalina by the writer, the collectors are mentioned.

Cladonia pyxidata chlorophaea, Floerk. Catalina.
 " fimbriata tubaeformis, Fr. "
 " " " Subspec. C. fibula, Nyl. Catalina.
 " furcata corymbosa, Nyl. Catalina.
Dendrographa leucophaea (Tuck.) Darbish. San Miguel and San Nicholas Islands. (Trask.)
Roccella fuciformis (L.) Ach. Catalina. (Trask.)
 " ceruchis Ach. Catalina. (Trask.)
 f. cephalota Auct. On Lycium californicum, Santa Barbara Island. (Trask.)
 " homalea, Ach. Shore cliffs, Catalina. (Trask, Hasse.)
 " reticulata, (Noehd.) Kremp. Catalina. (Trask.) The network is very open meshed with very slender and terete branches.
 " combeoides, Nyl. Beach rocks. Catalina. (Trask, Hasse.) On Leptosyne gigantea, San Nicholas, and dead twigs, Santa Barbara Islands. (Trask.)
 " calicaris fraxinea, Fr. Sterile, Catalina and Santa Barbara Islands. (Trask).
 " intermedia DC. Catalina. On twigs.
Usnea barbata hirta, Hoffm. Sterile, on branches. Catalina.
 " " f. rubiginosa, Michx. Catalina and San Miguel. (Trask.)
 " " dasypoga, Fr. Catalina. (Trask.)

Evernia prunastri, Ach. Catalina and Santa Barbara Islands. (Trask.)

Schizopelte californica, Th. Fr. San Miguel. (Trask.) This interesting find extends the range of this species from the mainland, where it was originally found at San Diego, (Tuck. Syn. N. A. Li.), to the archipelago.

Parmelia physodes enteromorpha, Tuck. Catalina. (Trask.)

" perlata (L.) Ach. Catalina. (Trask.)

" olivetorum, Nyl. As found on the mainland, this insular plant is also sterile. Trunks. Catalina. (Trask.)

" laevigata, Nyl. On quercus dumosa, Catalina. (Trask.)

" conspersa, Ach. Rocks and earth, Catalina. (Trask.)

Theloschistes chrysophthalmus flavicans, Walk. Catalina. (Trask.)

" lychneus pigmaeus, Fr. Rocks and bleached whale bones, San Nicholas. (Trask.)

" parietina (L.) Norm. Santa Barbara. On dead twigs of Lycium californicum, also on Leptosyne gigantea, a form with radiately lobed thallus, at the circumference of the lobes crenate and contiguous or imbricated; toward the center glebus or granulated; surface of thallus whitish pulverulent. Sp. 8, polarilocular. 14-16 mmm. long, 6 mmm. thick, Asci 44 mmm. long, 16 mmm. thick. Paraphyses distinct, separate, about 44-46 mmm. long, agreeing with F. congratulata (Crombie, Br. Li. I-298.)

" parietina, (L.) Norm.-f. terrestris Auct. Earth on rocks, Catalina.

Physcia aipolia, Nyl. Rocks, Catalina. (Trask.)

" stellaris, Fr. Catalina. Trask.

" comosa, (Sch.) Nyl. Dead twigs of Lycium californicum. Santa Barbara Isle. (Trask.)

" hispida (Schreb.) Tuck. Trees, Catalina. (Trask).

Placodium murorum, (Hoffm.) DC. Catalina. (Trask.)

" cerinum, Naeg. & Hepp. On dead fruit capsules of Megarrhiza, San Miguel. Bone, San Nicolas. Leptosyne gigantea. Santa Barbara. (Trask.)

" cerinum sideritis Tuck. On rocks, San Nicolas and Santa Barbara. (Trask.)

Placodium bolacinum Tuck. Rocks, San Nicolas and Santa Barbara. (Trask.)

" coralloides, Tuck. Rocks, San Nicolas. The original locality of this species is San Francisco, Cal. (Tuck. Syn. N. A. Li.); its range is thus considerably extended.

" aurantiacum, Naeg. & Hepp. On Lycium californicum, San Nicolas and Santa Barbara Islands (Trask).

" ferrugineum, Hepp. Rocks and bones, San Nicolas. (Trask.)

" " festivum, (Nyl.) Rocks, San Nicolas. (Trask.)

" " Wrightii, Tuck. On Quercus dumosa, Catalina (Trask.)

Lecanora muralis (Schreb.) Schaer. Catalina.

" " catalinae, Stiz. Catalina.

" zanthophana Nyl. Catalina. (Trask, Eastwood, Hasse.) Also Santa Barbara Islands. (Trask.)

" erysibe sincerior, Nyl. Calcareous rock, San Miguel (Trask.)

" subfusca, Ach. Barks, Catalina, and dead Opuntia prolifera, San Nicolas (Trask.)

" campestris Nyl. San Miguel. (Trask.)

" pallida, (Screb.) Schaer. and the var. cancriformis, Tuck. On barks, Catalina. (Trask, Haase.)

" varia, Nyl. Bark, Santa Barbara. (Trask.)

" simmictica, Ach. On Lycium californicum, Santa Barbara. (Trask.)

" dimera, Nyl. Barks, Catalina. (Trask.)

" atra, Ach. Catalina.

" athroocarpa, Nyl. Catalina. (Trask.)

" cinerea, (L.) Somm. Catalina. (Eastwood.)

" laevata, Nyl. Catalina.

" sordida, (Pers.) Th. Fr. Catalina. (Eastwood.)

" spodophaeiza, Nyl. Crombie Br. Li. I, 487. Sp. 13-14 mmm. long, ¾ mmm. thick, oblong, ellipsoid, entire, on bone, San Nicolas, and rocks, Santa Barbara. (Trask.)

Lecanora subcarnea, Ach. Catalina. (Trask.)
" Schleicheri, Nyl. Earth, Catalina.
" obpallens, Nyl. Earth, Catalina.
Rinodina radiata Tuck. Catalina.
" sophodes, Nyl. On caudex of Cotyledon, Catalina.

Two New Plants from Southern California.

BY S. B. PARISH.

ASTRAGALUS BRAUNTONII.

Perennial; the whole plant canescent with a short, soft pubesence; stems lignescent at base, 1-1.5 m. long, erect or reclinate; stipules membranous, acutely-triangular, erect and adpressed; leaflets 15-20 pairs, oblong 2-5cm. long; flowers and fruit reflexed, in cylindrical compactly many-flowered spikes, which are borne at the summit of the stem, and on short leafy branches below; calyx teeth slender, as long as the (3mm.) campanulate tube; corolla light purple, nearly 1cm. long; pod sessile, coriaceous, oblong, 1cm. long, beaked, slightly curved, deeply grooved on the dorsal and prominently ribbed on the ventral suture, two-celled by the nearly complete infolding of the dorsal suture for the lower two-thirds seminiferous part, but leaving an oval orifice at the upper end of each cell, splitting at maturity, and the two cells separately deciduous; seeds 2-3 in each cell.

In the Santa Monica range apparently rare. Above Santa Monica, "in sterile clay soil," Dr. H. E. Hasse, June 25, 1899, in ripe fruit, and May, 1902, (type) in flower and immature fruit. Near Sherman, growing in washed decomposed granite at 2,000 ft. alt."., June 18, 1901, Messrs. Ernest Braunton and George B. Grant. Type in Hb. Parish. Plate I.

This interesting species may associate with the flora of Los Angeles county the name of one of its most diligent explorers. In its gross aspect the plant resembles *A. pycnostachyus*, Gray, an inhabitant of the adjacent maritime meadows, but differs entirely in flower and fruit characters. The peculiar manner in which, at maturity, the cells split apart at the apex and permit the seeds to escape through the subapical orifices, afterwards falling away separately, does not occur in any other Astragalus of this region.

A, Calyx
B. Flower.
C. Cross Section of Pod.
D. Pod.
E. Cells Splitting.

ASTRAGALUS BRAUNTONII.
Plate I.

NEMACLADUS ADENOPHORUS.

An erect, annual herb 1-2 cm. high, glabrous, diffusely much-branched, the branches filiform; the rosulate basal leaves entire, obovate, 5 mm. long, the rameal reduced to subulate bracts; flowers scattered on capillary pedicels; calyx-tube hemispherical, less than 1 mm. high; its teeth equal; lobes of the upper lip of the bilabiate corolla about 2 mm. long, the middle margins fringed with long hairs, white, the tips purple-brown, which is continued in a narrow line down the center, lobes of lower lip somewhat smaller and less colored, or entirely white; filaments monodelphous from the base of the style nearly to its summit, free above and below, anthers free, oblong, with a minute cusp in the sinus of the emarginate apex; style incurved at the summit; ovary surmounted by four rounded, yellowish glands, the anterior pair each produced into an erect, stipe-like process bearing from its summit three parallel, obliquely-declined, pellucid, rod-like appendages; capsule 4-valved; seeds 10-12, oval, minutely tuberculate.

On dry, barren mesas, at Rabbit Springs, alt. 2,700 ft., on the Mojave Desert. 4956 Parish, June 1, 1901.

The character is drawn from field notes on the living plants, and the remarkable and elegant glandular appendages are difficult to make out in dry specimens. The disposition of color in the corolla, and the appendages of the glands, which appear nectariferous, suggest insect fertilization. But the plant is, in fact, self-fertilized. At anthesis the anthers are closed over the stigma, forming a globular termination to the style, and it is not till they have discharged their pollen that they become reflexed on their short free filaments, and leave the stigma exposed.

New Records for Los Angeles County.

BY ANSTRUTHER DAVIDSON, C. M., M. D.

Since the publication of my catalogue of the "Plants of Los Angeles Co.," by the Southern California Academy of Sciences, in 1896, the botanists of the coast, though few, have been very diligent in their explorations, and as a natural result, quite a few additions have been made to the county list, while the limited range hitherto accorded to many species has been widely extended.

Mr. Le Roy Abrams has, in the pages of this Bulletin, already made record of many species new to the county, and of a

few new to science; now to the former list I will add a few yet unrecorded.

The species here listed have all been examined by me, and when not my own record, the name of the botanist discovering them is in each case appended.

Raphanus Raphanistrum L. Two plants of this species were found in 1902 on Orchard Ave., in this city. I know of no other record of this for Southern California, and it seems to me strange that a plant that is in Europe so much more troublesome a pest than *Brassica nigra L.* should be so late in finding a foothold here. The pod being indehiscent, naturally prevents its ready dissemination among grain seeds.

Lesquerella Gordoni, Gray. In favorable seasons this modest crucifer colors the hills of Eastern Arizona with a golden sheen that stimulates the glow of a California poppy field. It is quite common on many of the sandy borders of the railway tracks and if not a native of California, it may be at any time expected to naturalize itself, at least along the desert route. In 1898 I found a few plants in the orchard near Little Rock Creek Hotel. Probably these were accidentally introduced.

Diplotaxis tenuifolia, D. C. must replace that of *D. muralis* of the Catalogue. Mr. Geo. B. Grant reports it as established for some years at Pasadena.

Lupinus Stiveri, Kellog. Wilson's Peak. (A. J. Grout).

Romneya Coulteri, Harvey . This beautiful poppy, hitherto unknown nearer Los Angeles than Santiago Cañon, Orange Co., was found lately on the hills near Puente by Mr. Watts, the geologist.

Cicer arietinum, L. This is the Egyptian chick pea, I found near the entrance to San Gabriel Valley, growing among the native shrubbery in seemingly natural fashion. This pea has lately been introduced as a kitchen vegetable. It seems to adapt itself readily to this soil.

Cotyledon nevadensis, Wats. San Gabriel Mts.

Cotyledon edulis, Brewer. What seems to be this species is abundant on some shady rocks that bound San Gabriel stream near its opening into the valley.

Layia elegans, Nutt. This is the common "tidy-tips" of the foothills district in the San Gabriel Valley, and is frequent at

Pasadena and Arroyo Seco. From Los Angeles to the coast its place is taken by *L. platyglossa.*

Helianthus Parishii, Gray. One clump exists at Oak Knoll, Pasadena (McClatchie). Mr. Parish, I believe, was the first to suggest that this plant was identical with *H. Oliveri,* Gray. Last summer I planted roots of both species in my garden. They grew as luxuriantly as they might have done in their native haunts. The stems, from 8 to 15 feet high, blossomed freely, and were quite showy. I could detect no difference between the species.

The Cienega between Los Angeles and Santa Monica is the type locality for *Oliveri.* There it still grows in diminished numbers, and the very tomentose forms seem distinctive enough, but all degrees of pubescence may be found in the space of a few yards. The most characteristic feature of these plants are the large, tuberous roots that resemble somewhat those of a dahlia. These are alike in both. In their natural habitat, the moist peaty swamps of the cienega, the tubers are quite close to the surface and are usually wholly submerged during the wet season. The swamps around here are fast being drained in the interest of "civilization." In the process of clearing by burning the tules, the tubers of the Helianthus readily perish in the conflagration. In a few years it will be totally extinct here. In the old Kurtz St. marsh, in the city, a large number grew, but the filling up of the marsh necessary to the extension of the railway yards has completely exterminated them there.

501 Laughlin Block.

Publications Received.

"Feeding Native Steers." No. 3, Vol. 15, Bulletin, Agricultural Experimental Station, University Tennessee.

"The Relative Value of Protein in Cotton Seed Meal, Cow-pea Hay and Wheat Bran." No. 4, Vol. 15, Bulletin Agricultural Experimental Station, University of Tennessee.

"Experimental Station Record." Nos. 2, 2, 3 and 4, Vol. 15, U. S. Department Agriculture.

"Transactions of the Massachusetts Horticultural Society." Part 1. 2, 1901.

"Provisional Methods for the Analysis of Food." Bulletin No. 65, Chemistry U. S. Department Agriculture.

"Foods and Food Control." Parts 1 and 2, Chemistry Bureau. Bulletin No. 69, U. S. Department Agriculture.

"The California Peach-Tree Borer," by C. V. Woodworth. Bulletin No. 143, Agricultural Experimental Station, University of California.

Transactions, February, 1903.

LOS ANGELES, CAL., FEBRUARY 2, 1903.

The regular monthly meeting of the Southern California Academy of Sciences was held this evening, President Comstock occupying the chair.

No business was transacted.

The subject for consideration was the second in the series of lectures on the subject of "Evolution," which on this occasion was dealt with from a biological standpoint. Papers were read by Dr. C. A. Whiting, Miss Agnes Claypole and Professor B. M. Davis.

A discussion followed, participated in by many members, after which the meeting stood adjourned.

B. R. BAUMGARDT, Secretary.

ASTRONOMICAL SECTION.

An unusually large attendance marked the meeting of this Section. Chairman Knight occupied the first half hour in presenting items of special interest in concised form on the following topics: Carnegie Institution Appropriations; an interesting meteoric stone that fell on September 13, 1902, at Antrim Ireland ; star lore for December, 1900; the comet of 1892, and several binary stars.

The chairman then introduced the main subject of the evening, the consideration of the recent book of Prof. Edgar Larkin, of the Mount Lowe Observatory, entitled, "Radiant Energy." The book was highly commended by the chairman, and Secretary Baumgardt of the Academy, read and commented upon several striking passages of the work. Several other members were asked to read certain passages of unusual interest, which were dilated upon by the author, who, in addition to thoughts suggested by the book, favored the Section with a brief account of the recent gathering of the Scientific Academy at Washington. D. C. The chairman closed the meeting by reading an extract from the proceedings of this important gathering relative to the pressure of light.

MELVILLE DOZIER, Secretary.

BIOLOGICAL SECTION.

The meeting of the Biological Section was called to order by the chairman.

The minutes of the previous meeting were read and approved.

The lecture of the evening was delivered by Dr. Agnes Claypole on the subject of Modern Physiology. The lecture was one of great importance

and consisted of a discussion of the physiological importance of blood study and of a study of the nervous system. The lecture was illustrated by black-board drawings by the lecturer.

It was discussed at length by a number of the members present, and the lecturer was called upon to answer a number of important questions suggested by the lecture.

Several microscopes were on the tables and a number of interesting preparations exhibited. About 25 members and visitors were present.

C. A. WHITING, Secretary.

GEOLOGICAL SECTION.

LOS ANGELES, CAL., January 26th, 1903.

The Geological Section of the Academy met at the Woman's Club Rooms and opened the meeting at 8 p. m. Geo. W. Parsons in the chair. Minutes of previous meeting read and approved. The Secretary read the By-Laws prepared by the Committee appointed for the purpose, which were adopted.

Prof. F. Lee Fuller was then introduced and gave a very interesting lecture on the comparative Geology of the United States in comparison with the Eastern, Middle and Western sections, with remarks on the metallurgy of zinc. Prof. Fuller remarked that the State ought to complete the work in regard to the geological formation of California's deposits, as every man was an authority unto himself as far as the Sierra and coast ranges were concerned. He stated that the best zinc ores were found in Arkansas and Indian Territory, and that there were large deposits in New Mexico, but are refractory and not so valuable. He also explained the mode of treating the ores in the furnace. He stated that the sublimate of lead used in the manufacture of paints is likely to prove of value on this coast, in preference to the oxides, for the reason that they resist the action of the salt air.

The meeting then adjourned. G. MAJOR TABER, Secretary.

VOL. II. MARCH 1, 1903 NO. 3

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION
A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER G. W. PARSONS

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BULLETIN

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VOL. 2. LOS ANGELES, CAL., MARCH 1, 1903. NO. 3

116 North Broadway

Contributions to the Lichen-flora of the Californian Coast Islands.

BY DR. H. E. HASSE.

Rinodina exigua, Fr. On Leptosyne gigantea, Santa Barbara. (Trask.)

" angelica, Stiz. Catalina.

Dirina rediunta, (Stiz.) Zahlbr. Catalina.

" hassei, Zahlbr. Catalina.

Pertusaria flavicunda, Tuck. Catalina. (Trask.)

" Wolfeni, DC. Twigs, Catalina. (Trask.)

Urceolaria scruposa (L.) Nyl. and

" gypsacea, Nyl. Earth, Catalina.

Biatora sylvana, Koerb. Twigs, Catalina.

" mixta, Fr. San Nicolas (Trask.), Catalina.

" phaeophora, Stiz. Rocks, Catalina.

" scotopholis, Tuck. Rocks, Catalina.

" granulosa, Schaer. Sp. 8-10 u long, 4-5 u broad. Some with false septa on old sheep's horn, San Miguel, (Trask.)

" Naegelii; Hepp. On oak, Catalina.

" spec. Sp. 8 nae, 8-11 u long, 4 u thick, ellipsoid simple or often bilocular. On Lyonothamnus floribundus var asplenifolia, Santa Rosa. Trask.)

" coarctata. Th, Fr. Earth, Catalina.

" franciscana, Tuck. Santa Barbara and San Nicolas. (Trask.)

" decipiens, (Ehrh.) Fr. Sterile squamule, San Nicolas (Trask.)

Lecidea lapicida, Fr. Catalina. (Trask.)
" " declinans, Nyl. Catalina.
" aromatica, (Som.) Ach. Rocks, Catalina.
" catalinaria, Stiz. Rocks, Catalina.
" enteroleuca, Fr. Sandstone, Catalina.

Buellia oidalea, Tuck. On various barks, Catalina. (Trask, Hasse.)
" triphragmia, Nyl. Catalina.
" Bolanderi, Tuck. Catalina.
" spuria, Arn. Catalina.
" halonia, (Ach.) Catalina on Cercocarpus traskiæ. (Trask.) On Heteromeles arbutifolia. (Hasse.)
" albo-atra saxicola, Fr. San Nicolas. (Trask.) Catalina.
" myriocarpa, Tuck. On Leptosyne gigantea, Santa Barbara. (Trask.)
" stellulata, Br. & Rostr. Santa Barbara. (Trask.) Thallus ochraceous from ferruginous rock substratum (?). Spores as in the type.
" badia, (Fr.) Koerb. Catalina.
" lepidastra, Tuck. Catalina. (Trask.)
" petræe, (Flot.-Koerb.) Tuck). Catalina.
" atro-albella, Nyl. Li. Paris, 1896—pag. 99. Catalina.

Lecanactis californica, Tuck. On Pinus, Torreyana, Santa Rosa. (Trask.) On barks, Catalina.

Platygrapha hypothallina, A. Zahlbr. N. SP. Bull. Tor. Bot. Club. Vol. XXVII, 645. Catalina. (Trask.)
" plurilocularis, A. Zahlbr. N. SP. Bot. Centralblatt. XIII. Heft 2, 156. On Rhus integrifolia, Catalina.

Opegrapha betulina, Nyl. On Oak, Catalina.
" vulgata, Nyl. Bark, Catalina. (Trask.)

Chiodecton ochroleucum, A. Zahlbr. N. SP. l.c. On Rhus integrifolia, Catalina. (Trask.)
" rubeo-cinctum, Nyl. Catalina. (Trask.)
" sanguineum, Waino. Catalina.

Arthonia Rhoidis, A. Zahlbr. N. SP. l. c. On Rhus laurina. Catalina.

" astroidea, Ach. On Leptosyne gigantea, San Nicolas. (Trask.) On various barks, Catalina.

" " Swartziana, Nyl. Catalina. More frequent and better developed than on the mainland.

" dispersa (Schrad.). Catalina. (Trask, Hasse.)

" " tetramera, Sitz. On oak,s Catalina.

" " cytisii, Mass. Catalina.

" anastomosans (Pers.) Fr. fil. Catalina.

" stictella, Stiz. Catalina.

" orbillifera, Ach. Catalina.

" impolita, (Ehrh.) Borr. Catalina.

Verrucaria maura, Wahlenb. Catalina. (Trask, Hasse.)

" punctiformis, Ach. On Heteromeles, Catalina.

" papillosa, Flk. f. terrestris, Arnold. Catalina.

A New Bee of the Genus Andronicus.

BY T. D. A. COCKERELL.

ANDRONICUS HESPERIUS, N. SP.

Male, length about 12 mm., but appearing less because the abdomen is curved downwards; entirely black, with scanty pubescence, which is white and flattened on sides of face and sides of clypeus, white, erect and quite long on scutellum and postscutellum, and less on other parts of the thorax, dull white and scanty on cheeks, scanty and purplish fuscous at extreme sides of abdomen; white forming apical bands on abdominal segments 3 to 5 (most distinct on 5); scanty and party fuscous on legs, more or less orange-fuscous on tarsi behind; head and thorax very densely punctured, abdomen not so densely (more shining), but still closely; head rounded, rather large, eyes greenish, facial quadrangle much longer than broad; mandibles broadly bidentate at apex; anterior edge of clypeus shining, slightly concave, not in the least keeled or produced; antennæ similar to those of *Alcidamea,* except that the apex is not hooked; scape stout, black; flagellum somewhat compressed, dark reddish beneath, the basal five joints swollen above; tegulæ dark ferruginous; wings stained with ferruginous, stigma very small, venation as in *Alcidamea,* first recurrent nervure joining second submarginal cell very near its base; legs ordinary; tarsi slender, claws bidentate at apex-pulvillus large; abdomen narrow and more or less cylindrical; seventh dorsal segment broadly truncate with rounded edges; claspers large and bristly; first ventral segment produced into a

narrow spine at apex; no ventral hump; second to fourth ventral segments each with a pair of transversely oval raised tubercles.

Hab.—Rock Creek, Mojave Desert, California. Dr. A. Davidson.) The only species of *Andronicus* hitherto known inhabits the Eastern States. The present insect is really intermediate between *Andronicus* and *Alcidamea,* tending most, I think, toward the former. It is perhaps doubtful whether the two genera should be kept apart, unless one is prepared to go to the extreme of providing a generic name for every aberrant member of this group, such as *A.hesperius.*

Publications Received.

"Journal of the Cincinnati Society of Natural History," Vol. 20, No. 3.

"The Mango in Porto Rico," U. S. Dept. Agriculture, Bureau of Plant Industry, Bulletin No. 28.

"Two New Ascomycetous Fungi parasitic on Marine Algae," by Minnie Reed, Univ. Cal. Botany, Vol. 1, pp. 141–164.

"Experimental Station Record," U. S. Dept. Agricult., Vol. 14, No. 5.

"An Experiment in Ginseng Culture," Penna. State College Agricult. Exper Station No. 92.

"Report of the Forester for 1902," U. S. Dept. Agricult.

"Roup," Ontario Agricultural College, Bulletin 125.

"Grasshoppers in California," by C. V. Woodworth. Bulletin No. 142, Agricultural Experimental Station, University of California.

"The Peach Worm," by W. T. Clarke. Bulletin No. 144. Agricultural Experimental Station, University of California.

"The Red Spider of Citrus Trees," by C. V. Woodworth. Bulletin No. 145, Agricultural Experimental Station, University of California.

"New Method of Grafting and Budding Vines," by E. H. Twight. Bulletin No. 146, Agricultural Experimental Station, University of California.

"A contribution to the Petrography of the John Day Basin," by Frank C. Calkins, Department Geology, No. 5, Vol. 3, University of California.

"The Igneous Rocks Near Pajaro," by J. A. Reid, Department Geology No. 6, Vol. 3, University Cal.

"Eucalyptus Cultivated in the United States," by A. J. McClatchie, Bureau of Forestry, Bulletin No. 35, U. S. Department Agriculture.

"Report on a Botanical Survey of the Dismal Swamp Region." Division of Botany No. 6, Vol. V., U. S. Department of Agriculture.

"Biennial Report of the President of the University of California," 1900–1902.

Notes and News.

Anatolmis regulus, n. sp., from the Sierra Madre Mountains, Los Angeles County. *Pamphila sabuleti*, var. *tecumseh*, n. var. from the high sierras of California, and the rare *Thecla spadix* Edwards, from Mount Wilson, are reported by Fordyce Grinnell, Jr., in "Entom. News," Jan., '03.

According to experiments made by the California Experiment Station the English oak (*Quercus robur*) appears to be one of the most rapidly growing hardwood trees thus far grown in the state. The Asia Minor willow (*Salix Salmoni*) planted from cuttings in 1895, measured 32 feet in October, 1897, with trunks 32 inches in circumference.

The State of New Jersey has not maintained its popular reputation as a mosquito infested locality without good reason. Prof. J. B. Smith reported recently that he bred twenty species of mosquitos during the last season in New Jersey.

Through inadvertence the paging of the first part of Vol. 2 of the BULLETIN was continued from that of Vol. 1. This issue is paged as if the first part had been begun as page 1.

The culture of the Ginseng root has been more or less engaging the attention of horticulturists for some time. The latest authentic experiments are indeed encouraging. The Pennsylvania college in a recent bulletin gives the probable net profit from one acre as $15,401 in five years.

Professor J. Burt Davy, late of the University of California, has received the important appointment of Botanist and Agrostologist to the Transvaal Colony, South Africa.

Transactions, March, 1903.

ACADEMY OF SCIENCES.

The regular meeting of the Academy of Sciences met at the Woman's Club rooms. President Theo. B. Comstock called the meeting to order at 8 p. m. In his opening remarks he called the attention of the members to the provision of the By-Laws requiring the members of the Academy to present the names of members who they desired to fill the offices for the ensuing year, which names would be considered by the board for final action.

Geo. W. Parsons was called to the chair. President Comstock gave a very interesting lecture on the "Geologic Time and Earliest Stages of Earth's History," illustrating the same by crayon sketches.

Dr. Agnes M. Claypole read paper on "Physographic Evolution Development of Earth's Surface Features."

Prof. Comstock closed the meeting with remarks on the "Outline of Evolution of Life in the Earth." B. R. BAUMGARDT, Secretary.

ASTRONOMICAL SECTION.

The Section was called to order at 8 p. m. by Chairman Knight. The chairman gave a brief outline of the present position of the planet Mars,

illustrating by diagram, and indicated how and when it would become most favorably situated for observation. Mr. Knight then read a sketch of the life and labors of Sir George Stokes, scientist and mathematician of England, who has recently passed away.

He also read an extract from a recent publication describing an aerolite that fell in Kentucky in November last, weighing thirteen pounds, and having the specific gravity of 3.48.

The chairman then introduced the principal topic of the evening by giving a brief sketch of the character and work of Dr. Alfred Russell Wallace of England, and requested Mr. B. R. Baumgardt to read a synopsis of the recent article of Dr. Walace relative to the earth as the center of the universe and man as the chief factor of the universe.

By request of the chairman, Mr. Dozier also read extracts from an article by Prof. Wm. H. Pickering, commenting upon Dr. Wallace's position and taking issue with his conclusions.

The discussion then turned upon Dr. Wallace's conclusions relative to the supreme importance of man in the scheme of creation, and involved references to religious as well as scientific questions, whereupon the chairman brought the discussion to a close.

Notice was given that at the April meeting, unless contrary notice were given, Mr. Baumgardt would deliver a lecture on Astronomy, in which would be exhibited many of the finest and most recent slides illustrating some of the recent developments of astronomical photography. The meeting then adjourned.

MELVILLE DOZIER, Secretary.

BIOLOGICAL SECTION.

The meeting was called to order by the chairman of the Section, B. M. Davis.

The minutes of the last meeting were read and approved.

As the speaker of the evening, Dr. Beale, was not present, the chairman withdrew to escort him to the club house.

While he was gone, the meeting was addressed on Practical Evolution by Prof. Ulrey, Dr. Houghton and Dr. Small. Dr. Beale arrived as this discussion came to an end, and at once began his lecture on the Food of Birds and Their Economic Relationship. The lecture was intensely interesting and led a number of members to ask questions, which the lecturer kindly answered.

On motion the meeting adjourned. About twenty-five members and visitors were present.

C. A. WHITING, Secretary.

GEOLOGICAL SECTION.

LOS ANGELES, CAL., February 24th, 1903.

The Geological Section met at the usual hour at the Woman's Club Rooms, which not being opened, Mr. Wm. H. Knight extended an invitation to the members present to adjourn to his residence, 1012 West Eighth Street. Chairman Geo. W. Parsons called the meeting to order. Minutes of previous meeting read and approved. There was a general discussion

upon several topics in the geological line, which was participated in by Prof. W. L. Watts, Dr. Stephen Bowers, who is connected with the State Geological Survey, Mr. Wm. H. Knight, and other members present.

G. MAJOR TABER, Secretary.

Astronomical Notes.

Much interest is being manifested just now in a theory recently uttered by Dr. Alfred Russell Wallace, of England, as follows:

"First, that the earth, or solar system, is the physical center of the stellar universe.

"Second, that the supreme end and purpose of this vast universe was the production and development of the living soul in the perishable body of man."

The following are some of the comments of astronomers relative to this theory:

BY DIRECTOR W. W. CAMPBELL OF LICK OBSERVATORY.

LICK OBSERVATORY, March 2.—I have not yet seen Dr. Wallace's article, but in regard to that subject I can say that while we know that our solar system is not near the edge of the stellar universe, yet the chances are that we are a considerable distance from the center of the stellar system The subject is assuredly thus far one open to a degree of conjecture. In fact, we might be a very great distance from the center, although we are somewhere near the plane of the Milky Way. But we have no evidence that we are the physical center, and the chances are that it is somewhere else.

As to his suggestions that the supreme end and purpose of this vast universe was the production and development of the living soul in the perishable body of man, that, it seems to me, is more a question for a philosopher than an astronomer. But we do not for a moment believe that the earth is the only body on which intelligent life may exist.

BY WILLIAM H. KNIGHT, PRESIDENT OF THE LOS ANGELES ACADEMY OF SCIENCES.

LOS ANGELES, March 2.—No one can assert that the earth is precisely in the center of a cluster of suns, nor that this cluster is located centrally and precisely in the plane of the Milky Way. But if we were so situated I fail to see that there would be any significance in that fact that would have the slightest bearing on the question of human development.

There was a time when it was the popular belief that the earth was the center of and most important feature in the universe; that the sun and planets and innumerable stars were simply ordained for the convenience of man. It is nearly a century since these views were entertained by any but the illiterate.

BY PROFESSOR A. O. LEUSCHNER OF THE STUDENTS' OBSERVATORY, UNIVERSITY OF CALIFORNIA.

BERKELEY, March 2.—From the reading of the article in today's *Examiner* I can only say that Dr. Wallace has not proved anything. He

has merely offered some pretty speculations. While he has not established anything, nobody is able to disprove what he says, because the opposite has not been established. The assertions, on the face of them, are not based on observational results.

BY PROFESSOR PICKERING OF HARVARD UNIVERSITY.

BOSTON, March 2.—It is not worth my while to take the time to upset another man's theories. We collect facts here and do not devote much time to theories. Dr. Wallace has not brought forward, as far as I can see, any evidence whatever to support his theories, and to his statement that the supreme end and purpose of this vast universe was the production and development of the living soul in the perishable body of man, that is a question for philosophy to solve, not for astronomy.

Professor George Davidson, of the University of California, eminent in astronomy and other natural sciences, says:

"Dr. Alfred Russell Wallace is a great authority on birds. He has collected enormously for years and has written largely on the birds and the geographical distribution of animals. Two or three years ago I heard the report that he had taken a sidetrack and gone into spiritualism. As to this astronomical matter, he doesn't know what he is talking about. Along his own lines, though, he is an anthority."

B. R. Baumgardt, secretary of the Southern California Academy of Sciences, says:

"Neither the earth, nor even the solar system, is the center of the solar universe. To be sure, they are situated somewhere near the center of the Milky Way; but it must be remembered that what is the center today will not be the center tomorrow. As there is a constant flux of force throughout the whole sweep of the sidereal universe, so, too, there is a constant motion in the bodies that make up its matter.

"As regards man and his soul, science teaches us the precise opposite from the plan proposed by Dr. Wallace. Science tells us that not only man, but even the evolution of the whole organic matter, is but one of a series of fleeting phenomena making up a chain without beginning and without end. The scientific man, be it remembered, sees nothing in the soul but the sum total of his own psychic activity."

Melville Dozier, secretary of the Astronomical Section, says:

"The fact that the earth itself is in motion around the sun is sufficient refutation of Dr. Wallace's proposition that the earth is the center of the stellar universe.

"As to Dr. Wallace's second conclusion, that the chief purpose of our earth is the creation and development of the human soul in the perishable body of man, there can be no question in my mind that this is the purpose of the Creator in bringing this earth into existence."

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COMMITTEE ON PUBLICATION
A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER G. W. PARSONS

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BULLETIN

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VOL. 2. LOS ANGELES, CAL., APRIL 1, 1903. NO. 4

116 North Broadway

NEW SOUTHERN CALIFORNIA PLANTS.

BY LE ROY ABRAMS.

Lepidium acutidens, (Gray).

Lepidium dictyotum var? acutidens, Gray. Proc. Amer. Acad. 12: 54. 1876.

Type locality Yreka, California.

Branching from the base, the branches decumbent or ascending; 10-20cm. long, pubescent throughout with short spreading hairs, leaves linear, tapering at both ends, entire or faintly and remotely denticulate, 2-5cm. long, about 2mm. wide; branches flowering about two-thirds their length; racemes rather loose; pedicels strongly flattened, 3-4mm. long, more or less, appressed to the stem to near the middle, then curving outward; pod strongly reticulated, sparsely pubescent, 4mm. long including the acute teeth, about 3mm. broad; sinus about 1mm. deep and 2mm. broad at the tip.

The loose and longer racemes, the spreading pedicels, the larger pods, and the spreading acute teeth readily distinguish this from L. dictyotum.

Cheiranthus suffrutescens.

Perennial, more or less branched, the branches woody, 1m. long or less, often straggling among low shrubs, rough from the persistent bases of the old leaves, usually about 5mm. thick, the floral branches clustered at the ends of the main ones,

slender, 3-4dm. long, leaves scattered along the floral branches, densely clothing their bases, very narrowly linear-oblanceolate, 2-3mm. wide, entire or remotely and obscurely denticulate; these as well as the branches cinerous with appressed 2-forked hairs, calyx-lobes 6-7mm. long, petals orange or yellow, cruciform, pods in rather short lax racemes, on pedicels about 8mm. long, widely spreading, straight or slightly curved upwards, 4-angled, 1.5-1.75mm. broad, 5-6cm. long, beak slender, less than 1mm. broad and but little longer, seeds brownish, about 1.5mm. long.

Quite unlike any known member of this genus in habit, but in fruiting characters closely resembling C. angustatus Greene.

Common on the sand dumes along the coast between Port Ballona and Redondo. The writer's number 2511, collected at Port Ballona, June 10, 1902, is the type.

Cotyledon nudicaule.

Glaucous and densely covered with a white meal; caudex short, rather stout, about 2cm. thick; leaves rosulate, numerous ascending, nearly terete, the inner face slightly flattened, tapering to an acute tip; 5-8cm. long, 4-6mm. thick, slightly dilated at the very base, scapes 15-30cm. high, 2-2.5mm. thick, with 2 nearly opposite (sometimes abortive) leaf-like bracts a little above the middle, otherwise naked, infloresence in a rather close, much branched cymose panicle, the main branches 4cm. long or less, freely branching, each branch and branchlet subtended by a short linear bract, flowers on pedicels 2.5-4mm. long, sepals ovate acutish, 2mm. long, petals white, united at the base, narrowly oblong, acute or somewhat acuminate, 6-7mm. long, spreading, white, carpels ovate-oblong, united a short distance above the base, divergent, 4-6mm. long, tipped by the slender style of nearly equal length; seeds few, linear-oblong, acute at both ends, slightly over 1mm. long.

Nearest C. edulis Nutt, in that it has the spreading petals, but easily distinguished by its mealy herbage, naked flowering branches and rather compact compound panicles.

Common on rocky cliffs near the mouth of the San Gabriel Canon, Los Angeles County. The author's number, 2652, collected July 4, 1902, is the type.

Stanford University.

New Plant Records for Los Angeles County, Part II.

BY ANSTRUTHER DAVIDSON, C. M., M. D.

Baeria tenella, Gray, which has been lost to view for a number of years, was found at Sycamore Grove and Glendora by L. A. Greata.

Hemizonella minima, Gray, in fair quantity on Wilson's Peak.

Nicolletia occidentalis, Gray. Little Rock Creek. A few plants were found along the foothills here; the type station, "sandy banks of the Mohave River," is about thirty miles west of this.

Chrysoma teretifolia, (Dur. and Hilg.), Greene. Little Rock Creek. The type station for this rarely collected plant is Fort Tejon, 60 miles to the westward.

Gutierezia lucida, Greene. Little Rock Creek. This is with the two preceeding plants, are rarely collected in this district as their time of flowering is Sept. and Oct., and when not in flower, they are readily mistaken for allied species.

Chicorium Intybus, L. Naturalized in various places in the city, and at Sherman, (Braunton.)

Gnaphalium purpureum, L. In sandy wastes at Lincoln Park.

Galinsoga parviflora, Cav. This tropical plant grows abundantly in various places along the irrigation ditches at Vernon, (Braunton.). This plant has not been previously reported from California. It probably reached us via. Arizona, where it is supposed to be indigenous.

Peucedanum tomentosum, Benth. Hills north of North Pomona, at 3,000 ft. alt., (Braunton.) This is a most interesting addition to our flora.

Convolvulus pentapetaloides, L. Rocky Point, San Pedro Hills, (Colton Russell.)

Cuscuta arvensis Beyrich. Redondo, (Grant,) Los Angeles City.

Solanum alaeaginifolium, Cav. Has been eradicated at East Los Angeles, (Braunton); but is still fairly abundant at San Pedro.

Tribulus terrestris, L. Along the railway bank at Port Los Angeles. A probable permanent introduction from Arizona.

Trifolium procumbens, L. In fair quantity in Los Angeles River-bed, (Braunton.)

Trifolium obtusiflorum, Hook. Riviera, (Braunton.)

Medicago apiculata, Willd. Pasadena, (Grant.) East Los Angeles.

PREHISTORIC CALIFORNIA.

(Continued from February BULLETIN)

BY DR. LORENZO GORDIN YATES.

PREHISTORIC FUANA OF CALIFORNIA.

PLATE I.

Figures of Fossils from the Cretaceous, and Cretaceous "B" (Eocene ?) of California, recently described by Dr. J. G. Cooper, for the California State Mining Bureau.*

1. *Terebra Wattsiana*, Cooper. Portion of anterior whorl broken off. Marysville Buttes, California.

2-4. *Surcula crenatospira,* Cooper. Fine sculpture not represented. Marysville Buttes, California.

5. *Narona Irelaniana,* Cooper Half of anterior whorl broken off. Marysville Buttes, California.

6-11. *Ancilla* (Oliverato) *californica,* Cooper. In Fig. 7 shell is much worn on the anterior face. Marysville Buttes, California.

12. *Cerithium Fairbanksi,* Cooper. Very little of the external surface remains to show details of sculpture. San Diego County, California. Cretaceous.

13. *Potamides ? Davisiana*, Cooper. Most of the aperture wanting. Marysville Buttes, California.

14-19. *Cerithidea carbonicola,* Cooper. Coal Mines, San Diego County, California. (Cretaceous "B".)

*Catalogue of Californian Fossils. (Parts II, III, IV, and V.) forming Bulletin No. 4, published by the California State Mining Bureau, Sacramento, 1894.

PLATE I.

PREHISTORIC FUANA OF CALIFORNIA.

PLATE 2.

Dr. Cooper's recently described species, continued.

(The figures 20 to 30 in this Plate are double the natural size.)

20-21. *Surcula inconstans*. Cooper. In variety. Marysville Buttes, California.

22. *Cordiera gracillima*, Cooper. Plications not well figured. Marysville Buttes, California.

23-24. *Pleurotoma Perkinsiana*, Cooper. Figures too wide. Marysville Buttes, California.

25-26. *Mangilia suturalis*, Cooper. Nodules too prominent Marysville Buttes, California.

27. *Drillia Ullreyana*, Cooper. Outlines not very correct. Marysville Buttes, California.

28-29. *Surcula monilifera*, Cooper. Marysville Buttes, California.

30. *Bittium longissimum*, Cooper. Marysville Buttes, California.

31. *Fusus supraplanus*, Cooper. Cretaceous. San Diego, California.

32. *Pleurotomo ? decipiens*, Cooper. Cretaceous. San Diego, California.

33-34. *Calliostoma Kempiana*, Cooper.

35. *Tornatina ? erratica*, Cooper. Cretaceous. San Diego, California.

3637. *Tornatella normalis*, Cooper. Cretaceous. San Diego, California.

38-39. *Siphonaria capuloides*, Cooper. Cretaceous. San Diego, California.

40. *Crenella santana*, Cooper. Cretaceous. San Diego and Orange Co., California.

41. *Mitra simplicissima*, Cooper. Cretaceous. San Diego, California.

42. *Corbula triangulata*. Cooper. Cretaceous. San Diego, California.

The oblique lines on the anterior end were intended for shading.

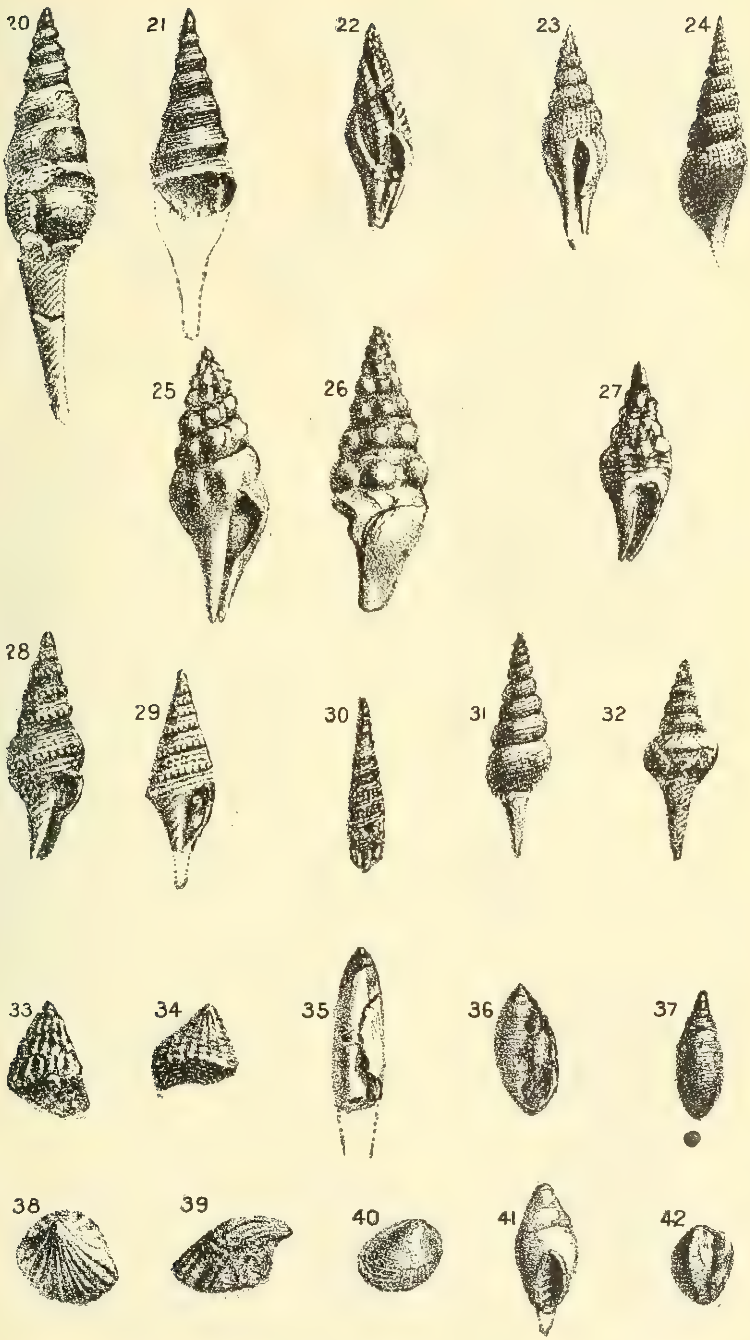

PLATE II.

PREHISTORIC FUANA OF CALIFORNIA.

PLATE 3.

Cretaceous Fossils from San Diego County, California, recently described by Dr. J. G. Cooper.

(Figures natural size.)

43. *Stomatia intermedia,* Cooper. Details of sculpture compiled from three specimens; Cretaceous; San Diego County, California.

44-45. *Astarte semidentata,* Cooper. Umbonal angle of 45 too narrow.

46. *Bulla assimilata,* Cooper.

47. *Crassatella Iomana,* Cooper.

48-49. *Megerlia dubitanda,* Cooper. Upper and lower odd valves.

50-51. *Waldheimia imbricata,* Cooper.

52. *Agasoma* (Trophosycon) *Barkerianum,* Cooper. Mouth imperfect. Pliocene; Kern County, California.

PLATE III.

PREHISTORIC FUANA OF CALIFORNIA.

PLATE 4.

Tertiary Fossils described by Dr. L. G. Yates, and by Thomas Conrad.†

53. *Pinna alamedensis,* L. G. Yates. Miocene. The type specimen from which this species was described was discovered by the writer in a Miocene boulder in Alameda County, California, and was nearly twice as large as the specimen figured, which was found in Kern County, in rocks of Pliocene age. Dr. Cooper says of this shell: "Yates' type was nearly twice as long as this, and complete in form."*

54. *Pinna venturensis,* L. G. Yates. Pliocene. Three-fourths the size of largest found, and with fewer ribs. Ventura County, California.

55-56. *Pecten discus,* Conrad. Pliocene. Kern County, California.

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*1. Report of State Mineralogist of California for 1887, page 259.
*Bulletin No. 4. California State Mining Bureau, 1894, page 65.

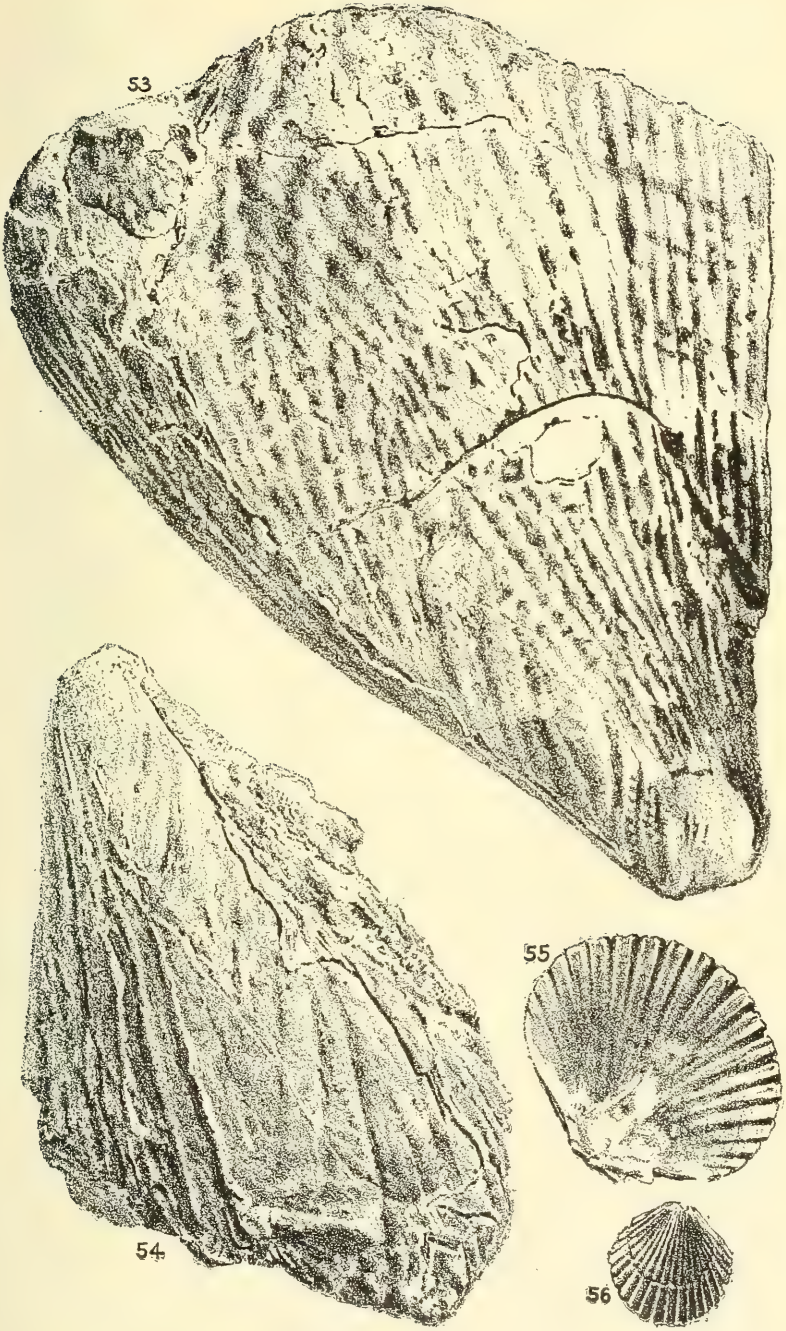

PLATE IV.

Additions to the Lichen-flora of Southern California.

BY DR. H. E. HASSE.

For the very accurate descriptions of the new species discovered since 1898, in our territory, Lichenologists of North America are indebted to Dr. A. Zahlbruckner, of the Royal Botanical Museum, of Vienna, and the writer also desires herewith to convey his tribute of appreciation to this conscientious naturalist. Without the detailed diagnoses of Dr. Zahlbruckner, the new material enumerated would be of but insignificant value to science.

Pyrenopsis phaeococca, Tuck. Sandstone boulders in Santa Monica Range, forming dull greenish-black patches.

" homoeopsis, Nyl. (Crombie, Br. Li. I. 25.) Argillaceous rocks, SMR.

Collema crispum, Borr. (Tuck. Syn. N. A. Li.—Crombie, l. c.) Gravelly and sandy soil, Mill Creek Canon, San Bernardino Mts.

" nigrescens leucopipta, Tuck. On a decayed stump, SMR.

" cheleum, Ach., forma monocarpum, Nyl. (Cr. l. c.) A microphylline state, on sandstone, SMR.

" verruciforme, Nyl. On bark, Yosemite Valley. Although extra limited, a few interesting collections from that locality are included.

Collemodium Schraderi, Nyl. Earth on rocks, San Gabriel Range; slate rocks, SMR; Santa Barbara.

l.c.) On earth, SMR.

Leptogium lacerum, Gray. Subsp, L. pulvinatum, Nyl. (Cr.

" minutissimum, (Floerk, Schaer.) Mass. Spores

" l. c.) on earth.

are 3-7 septate with some longitudinal septa and variable in size and shape. Earth, SMR.

" muscicola, Fr. (Cr. l.c.) Rocks among moss, Yosemite Valley.

" rhyparodes, Nyl. (Cr. l.c.) Rocks and stones, SMR.

Trachylia (Acolium) chloroconium, Tuck. Bark of Pseudotsuga, Yosemite Valley.

Yosemite Valley.

Sphinctrina microcephala, Nyl. Bark of dead oak, San Gabriel Range.

Stenocybe tremulicola, Norrl. (Bull. Torr. Bot. Cl.—Hue Add. Nov. Li. Europ. 1886, No. 140.) Distributed as S. byssacea, a sub-species. On Juglans californica, S. M. R.

Rocella fuciformis, (L.) Ach. Catalina Island. (Trask.)

Ramalina linearis, (L.) Sw., (R. canaliculata, Fr.) Branches, SMR.

" calicaris fastgata, Fr. Near Los Angeles, (Ernest Braunton.)

" geniculata, Hook. & Tayl. Branches, SMR.

" complanta, (w.) Ach. Branches, SMR.

Usnea dasypoga scabrata, Nyl. C(r. l.c. 205,) Catalina, (Trask.)

Cetraria platyphylla, Tuck. On Pinus Lambertiana, near Yosemite Valley.

" juniperina, Ach. Dead branches of pines, Wanona, Mariposa Co.

Parmelia exasperata, Nyl. Rocks, SMR.

" prolixa, Nyl. Sterile. Rocks near Elsinore.

" sphaerosporella, Mull. Arg. on Pinus Lambertina, Dr. A. Zahlbruck ner, Beih. Botan. Centralbl. Heft 2, 1902.) New to N. America.

" stygia, (L.) Ach. Steryle. San Bernardino Mts., near Bear Valley.

" lanata, Wahl. Rocks Clouds Rest, Yosemite Valley.

Nephroma helveticum, (L.) Mass. On bark, Yosemite Valley.

Physcia stellaris, Nyl. Subspec. P. tenella, Nyl. On fences at Ballona.

" puverulenta, Nyl. Subspec. P. pityrea, Nyl. On bark in San Gabriel Mts.

" astroidea, (Fr.), Nyl. On Quercus agrifolia, SMR.

Pyxine sorediata, Fr. For several years I have collected a sterile Thallus on various barks, but only recently fruiting specimens were found. The thallus is closely attached to the substratum and not "densly fibrillose beneath." The young Apothecia are slightly pruinose with a prominent, entire margin; the more matured are naked, brownish-black, with a lecideine flexuous margin and a rogose disk. On Sambucus glauca, near the Soldiers' Home. So far as known this species has not been previously reported from the Pacific coast.

Gyrophora erosa, Ach. (Cr. l.c.—Umbilicaria, Tuck. Syn N. A. Li.) Frequent on rocks, Yosemite Valley.

Pannaria brunnea, (Sw.) Mass. On earth in woods near Santa Barbara.

Heppia conchildobata, A. Zahlbruck. sp. nov. l.c. On granite, Palm Springs.

' hassei, A. Zahlbruck, sp. nov. l.c. On granite, Palm Springs.

Placodium bolacinum, Tuck. Rocks, frequent. SMR.

" ferrugineum Wrightii, Tuck. Catalina. (Trask.)

" festivum, Nyl. (P. ferrugineum festivum, Nyl.) Cr. l.c. Appears to be an athalline form of P frrugineum. On rocks, frequent. SMR.

Placodium microphillum, Tuck. On dead wood, SMR.
" coralloides, Tuck. Santa Barbara Island. (Trask.)
" epixanthum, Nyl. Rocks. Palm Springs. SMR. very similar to P. vitellinum; the disk is greenish yellow, with a paler yellow margin, and the asci contain eight spores, simple and polari bilocular.
" candicans, Schaer. Cr. l.c. Argillaceous rock, SMR.
" teicholytum, Ach. Cr. l.c. Calcareous rock, SMR.
Lecanora atrynea, Nyl. Cr. l.c. Rocks, San Gabriel Mts. This is one of the confusing L. subfusca group which Nylander has split into a number of species, varieties and forms based upon differing chemical thalline reactions, structure of the paraphyses, etc., but which seem more or less to intermingle.
" varia polytropha, Nyl. Tuck. Syn. N. A. Li. (L polytropa, Nyl. Cr. l.c.) Rocks, SMR.
" gyalectodes, Nyl. Calcareous rock Malibu Canon, SMR. This species was diagnosed by Dr. Nylander in 1899, but I have seen no description. The thallus forms a mealy white crust. Apothecia are urceolate with a white pulverlent thalline margin, thick, entire or radiously crenate. Disk convex, orange colored. Spores in 8's, colorless, muriform, oblong ovate, 24mm. long by 12mm. thick.

The Lichen-flora of San Clemente Island.

BY DR. H. E. HASSE.

Ramalina Menziesii, Tuck. On Heteromeles.
" combeoides, Nyl.
" ceruchis, Ach. DeNot. f. cephalota, Auctt.
" calicaris farinacea, Schaer.
" reticulata, Noehd. Kremp. On Quercus.
Dendrographa leucophaea, Tuck. Darbish.
Physcia erinacea, (Ach.) Tuck.
Usnea hirta, Hoffm. Sterile.
Schizopelte Californica, Th. Fr.
Placodium coralloides Tuck. Rocks near the beach.
" sp., undetermined.
" ferrugineum, Huds. Hepp.
" aurantiacum, (Lightf.), Naeg and Hepp.
Lecanora pallida, (Schreb), Schaer.
" subfusca, (L.), Ach.
" varia, (Ehrh.), Nyl.
" Roboris Nyl, (Rinodina confragosa.) On oak.

Perusaria flavicunda, Tuck.
Lecidea enteroleuca, Fr.
Buellia oidalea penichra, Tuck.
" parasema, (Ach.), Th. Fr.
Lecidea (?), sp. Undetermined.

The species here recorded were collected by Mrs. Blanche Trask.

The University of California has decided to conduct the Summer School of Forestry at Idylwild.

Notes and News.

The U. S. steamer Albatross, that has done such good work in in deep sea exploration on this coast, will sail for Alaska to investigate the condition of the salmon fisheries. Prof. D. S. Jordan will be in charge of the scientists engaged in the work.

Loren, E. Hunt a graduate of Berkeley, has been placed in charge of the Forestry Experiment Station at the University of California. A series of tests are to be made of the physical and chemical properties of the durability, strength, and elasticity of the timbers of the Pacific Coast.

Le Roy Abrams has left Stanford for a prolonged botanical tour of the southern counties.

Encouraged by the success of the Arizona Experiment Station in the cultivation of dates, some energetic colonists in the new settlement of Imperial are taking steps to plant out orchards of date trees there.

Prof. F. E. L. Beale, chief of the Bureau of Ecomonic Ornithology is at present visiting California investigating the habits of our native birds, what seed they eat, which are useful to the agriculturist, and which are injurious. The professor addressed meetings both at Pomona College and at the Biological section meeting of ourAcademy.

The difficulty of separating the various pathogenic bacilli from the liquid antitoxine they produce has been solved by the director of the Jenner Institute in London. By the aid of the liquid air the bacilli are frozen, triturated, and thus destroyed.

Mr. T. D. A. Cockerell has presented the Academy with a number of reprints of articles descriptive of new species of plants and insects.

Two large palms, nearly 60 feet in height were recently transported from Los Angeles to adorn the grounds of a private citizen on Knob Hill, San Francisco.

A species of Basil, technically known as Ocimum viride Willd, is the latest discovered remedy for mosquitos. It is claimed that this shrub, which has hitherto been known as "the Sierra Leone fever plant," will, by its mere presence in a room effectually secure its inmates from molestation by mosquitos.

The Park Comission has granted the Sericultural Club of Los Angeles the use of four acres of land in Elysian Park to be devoted to the planting of mulberry trees. The club are endeavoring to introduce the silk worm and develop the silk industry.

The San Jose scale is now suposed to have been originally introduced on peach trees brought from China by the late James Lick.

Mr. L. O. Howard, chief of the Division of Entomology, states that the damage done by insects to agricultural products of this country

amounts to $3000,000,000 per annum, and for the control of which the government spends only $150,000 a year.

In a paper read by B. E. Furnow at the meeting of the American Science Association, the estimates given of the growth and consumption 000 acres of alkali soil in the West can by proper drainage be made able timber will be exhausted in 30 years.

The officers of the Bureau of Soils believe that much of the 6,000,- of the wood supply of the United States would indicate that all the avail- productive.

As natural immunity to the effects of bee stings is acquired by many individuals after being stung from 1 to 30 times, it is suggested that artificial immunization might be made possible by means of serum vaccination.

Publications Received.

"Combating the flat-headed Borer," by A. J. McClatchie, University Arizona, Agricultural Experiment Station. Timely Hints for Farmers, No. 45.

Thirteenth Annual Report Agricultural Experiment Station, University of Arizona."

"The Culture of Mulberry Silkworm,' Division Entomology. Bulletin No. 39 United States Department Agriculture.

"Experiment Station Record," No. 6, Vol. 14, United States Department of Agriculture.

"The Lime, Sulphur and Salt Wash Used for San Jose Scale," United States Department of Agriculture. Circular No. 52.

'Methods for the Investigation of Canceling Inks and Other Stamping Inks." United States Department of Agriculture, Chemistry Bureau. Circular No. 12.

"Los Criaderos de Fierro del Cerro de Mercado, Durango." Bulletin of Geological Institute of Mexico. No. 16.

Transactions.

Los Angeles, Cal., March 23rd, 1903.

The Geological Section of the Academy of Sciences met at the Woman's Club Rooms at 8 P. M. Chairman George W. Parsons called the meeting to order. Minutes of previous meeting read and approved. Dr. Stephen Bowers, Ph. D., read an article on the "Depest Wells of the World." He stated that the Comstock Mine which was 3300 feet in depth was the deepest mine on the Pacific Coast; that the heat was so great that a large number of shifts were required each day. The deepest well ever drilled in the world was in Eastern Silesia, which reached the depth of 6,511 feet, the temperature at the bottom being 157 degrees. He also mentioned a deep well near Berlin of 4170 feet, and one near Leipsic which reached the depth of 5740 feet, with temperature of 135 degrees at the bottom. At Wheeling, West Va., a well was sunk 4500 feet, the temperature at the bottom was 110 degrees. The deepest well on this Continent was sunk at West Elizabeth, Pa. to the depth of 5386 feet. The temperature at the bottom was 127 degrees. In drilling this well they passed through 137 distinct formations, 68 were slate, 22 limestone, 27 sandstone, 7 of red rock, 4 coal seams, and stratas of shale; 90 of the stratas were of deep water formation, and 34 formed in shallow water. They reached the upper Silurian or lower Devonian, and each of the 137 formations indicated a period of untold ages. Questions and discussions followed in which Messrs. Crosby, Parsons and Taber took part.

G. MAJOR TABER, Secretary.

BULLETIN
OF THE
Southern California Academy of Sciences

VOL. 2. LOS ANGELES, CAL., MAY 1, 1903. NO. 5

116 North Broadway

The Late Visiit in force of the "Painted Lady" Butterfly Vanessa Cardui, L.

BY PROF. J. J. RIVERS

This butterfly in California is both endemic and epidemic so is at all times an emigrant. Ordinarily its habit is to produce two broods in the year, the second brood appearing late in the summer, a portion of which hibernate through the winter. During some years the insect is scarce, but this spring it has appeared in immense numbers calling forth press notices daily. One observer states that the cloud of insects was so dense as to throw a shadow on the ground. It is quite conjectural why this and some other Lepidoptera take on this roaming habit; it is possibly atmospheric influences which suggest a suitable time to move to pastures new. It is, however, unlikely that these great hordes start from one locality, as the taste of the caterpillar is not as omnivorous as that of the grasshopper, and therefore are spread over a large area of territory and the army increases as it marches along. The "painted lady" butterfly ought to be an educated insect, as it is a great traveler, and is a positive native of the four quarters of the earth. In heraldry it has the right to the globe on its shield, with the words Europe, Asia, Africa, America.

The butterflies which are so numerous for about a week are no longer to be seen, but rarely and singly. The question is what has become of them; have they rejoined the main army or have they fulfilled the law of life, deposited their ova and died, in accordance with the habit of the Lepidoptera? If this latter be the true explanation, then the summer brood will be great.

The agriculturists talk of destroying all the thistles, and should they succeed in this, the "Painted-lady" will get even with the community by pouncing on the hollyhocks and sunflowers of the gardens. In all probability the main body passed on beyond the limits of California. One observer states that a large cloud of butterflies took a course to seaward; unless a change of wind drove this company to land, most of them would perish, though, some might reach a friendly isle in the Pacific, having had the luck to get into a high current.

The food plants of the larva are chiefly Thistles, Hollyhocks and Sunflowers.

The following species of Venessa are also to be found in our neighborhood.

Vanessa carye (Hubner).

This is our common, everyday butterfly, the caterpillar of which feeds upon all plants Malvaceous; this little worm has the constructive habit of the genus, by forming a house to live in and then eating it. Its method is to draw the lateral edges of a leaf together and fasten them with silk, thus forming a tubular protection to the larva, which devours its dwelling at liesure. This species is a true native, found only in the maritime portions of the Golden West.

Vanessa Atlanta (Linn).

The common name of this species is the Red Admiral. It has much the same habits as the "Painted-lady" though its range is not so great. It is found all over the United States of North America and over all Europe. The food plants of the caterpillar are nettles and hops. It is a showy butterfly and bears upon each upper wing a strangely marked band of red. It is not a common insect and uncertain in appearing.

Vanessa Huntera (Fab).

This is also a California insect, the markings of which are clearly and beautifully delineated, after the style of the "Painted-lady" but a great deal prettier. The food plants of its caterpillar are Gnaphalium Californicum, which grows in dry places. It may also be found on some species of Artemisia.

This butter fly inhabits the United States of North America and Mexico, is generally distributed, but not common.

(Ocean Park.)

Additions to the Lichen-flora of Southern California.
Part II.

BY DR. H. E. HASSE.

Lecanora spodophaeiza, Nyl. (Cr. 1c.) Santa Barbara Island. (Trask.) "Spores oblong or fusiform-oblong, simple or spuriously I-septate."

" calcarea (L.) Somm. Rocks, SMR. A Lichen with variable thallus, giving rise to several var. and forms.

" glaucocarpa depauperata, (Cr. l. c.) and the form pruinifera. Rocks SMR. and elsewhere; also a multiform Lichen.

" simplex, Nyl. f. complicata, Crombie (l. c.) A form with merely an angulose and plicate margin. Throughout.

" (Acarospora) EPILUTESCENS. A. Zahlbr. Spec. nov. (l. c.). Palm Springs.

" (Acarospora) PELTASTICTA, Zahlbr. spec. nov (l. c.) Palm Springs.

" (Acarpospora) REAGENS, A. Zahlbr. spec. nov. , (l. c.) Palm Springs.

Lecania turicensis CALIFORNIA, A. Zahlbr. var. nov. (l. c.) SMR.

" TONINIOIDES, A. Zahlbr, spec. nov. (l. c.) Ballona , Bluffs.

Rinodina succedens, Nyl. On Pseudotsuga. Throughout the higher mountain ranges. This species is also reported from New Foundland by Prof. Macounin, Catalogue of Canadian Plants, 1902.

Dirina rediunta, (Stiz.) A. Zahlbr. Catalina and on the mainland.

" Hassei, A. Zahlbr. Near Santa Monica and recently found also on Catalina on Heteromeles arbutifolia.

Pertusaria leioplaca, (Ach.) Schaer. Santa Monica Range, on Oak.

" ambigens, (Nyl.) Tuck. On Umbellularia Californica,in canyons of San Gabriel Range.

globifera (Tuen.) On bark of conifers, near Seven Oaks, San Bernardino Mts. New to North America.

Phlyctis agelea, Koerb. On California walnut. SMR.

Urceolaria scruposa, Ach. subsp. U. bryophylla, Nyl. Running over Cladonia pyxidata, SM R.

Biatora decipiens, (Ehrh.) Th. Fr. Earth, SMR., rare. At Elsinore and Palm Springs, abundant.

" granulosa PHYLLIZANS, A. Zahlbr. var. nov. (l. c.) Earth among moss, San Gabriel Range.

" granulosa corallina, Tuck. Barks, SMR.

" Schweinitzee, Fr. Bark of Heteromeles, SMR.

" Nylanderi, Anz. Bark of conifers, San Gabriel Canyon.

" umbrina, (ach.) On rocks at Santa Barbara.

" mutablis, (Fee) On Cupressus, Yosemite Valley.

" fusco-rubella, (Hoffm.) On Heteromeles, SMR.

" (Bilimbia) GYALECTIFORMIS, A. Zahlbr. spec. nov. (l. c.) Palm Spring.

" XANTHOCOCCI, A. Zahlbr. (Bull. Torr. Bot. Cl. XXVII.) Bark of conifers, near Seven Ooaks, San Bernardino Mts.

Lecidea CINERATA, A. Zahlbr. spec. nov. (Bull. Torr. Bot. Cl. XXVII, 1900.) On disintegrated granite, SMR.

" SUBPLEBEIA, Nyl. n. sp. Named by the late Dr. Nylander without having given a description. On earth and calcarious pebbles, SMR., 1896. The thalllus is crustaceous effigurate, pulverulent

ochroleucous. Apothecia small, black, immarginate. Paraphyses articulated, with small globular heads. Spores in eights, simple, colorless, broadly elipsoid, 10-12 mmm long, 6-8 mmm thick. Hypothecium colorless.

" DOLODES, Nyl. n. sp. Named by Dr. Nylander in 1897, without a description. Thallus of small, loosely contiguous, slightly rugose, convex, crenulate or lobulated margined, brown scales. Apothecia sessile, small and urceolate, becoming larger, disk flat, black, with a permanent, thick, entire or faintly flexuose, greyish black margin. Internally dark. Asci oblong tubular, 80-84 mmm long and 12 mmm thick. Spores in 8's, globular, 6-7 mmm in diameter. Hymenium 100 mmm high. Hypothecium faintly colored. Paraphyses slender, distinct. On Pseudotsuga macrocarpa, San Gabriel Range, at Mt. Wilson.

" parissima, Nyl. (Leighton, Li. Fl. Gr. Brit.) On bark of Pseudotsuga macrocarpa, at Mount Wilson.

" protabacina, Nyl. On granite, near summit of San Antonio Mt., at 3300 metr. alt. Not knowing when or where the species has been published, a short description is given. Thallus of cartilaginous, approximated, convex, red-brown squamae, 1-2 mmm in diameter, entire or sinuous to deeply lobate margin, this black edged. Apothecia black, small, flat with a turgid, entire or flexuous margin, to larger convex and becoming immarginate. Separate or several contiguous. Hypothallus black. Thallus Ka., C. Spores in 8's ellipsoid 9-11 mmm long, 3-3'5 mmm thick. Hym. Gel. J-blue, turning brown.

" ruginosa, Tuck. San Gabr. and SMR.

melanccheima, Tuck. On Rhus diversiloba, SMR, and bark of conifers San Gabr. Range.

" enteroleuca aequata, Floerk. Rocks, San Gabriel and San Bernardino Ranges.

" enteroleuca ambigua, Anz. (L. parasema Ach.) v. tabescens (Koerb.) Leighton l. c. 3rd edit. 1879.)

" cyrtidia, Tuck. Sandstone, SMR.

" plana, Lahm. Sandstone, SMR. New to North America.

NOTES.

The final steps in the incorporation of the Southern California Academy of Sciences have been consummated and the incorporation papers have been forwarded to the secretary by the Secretary of State

at Sacramento. The expense of incorporation, filing of documents, etc., amounting to twenty-five dollars ($25.00) have been borne personally by President Theo. B. Comstock.

Judge Cheney, a valuable member of our Academy, volunteered his legal services in drawing up the incorporation papers entirely free of expense to the Academy. To both of these gentlemen the thanks of the Southern California Academy of Sciences are due.

Professor W. J. Hussey, the well-known Double Observer of the Lick Observatory, in Southern California at present, is making astronomical observations in the interests of science. He has been for the last two weeks at Echo Mountain, using the Mt. Lowe sixteen-inch refractor. Although, owing to cloudiness, there were but few nights during which the telescope could be used to advantage. Nevertheless, no less than fourteen new double stars were discovered during this short period of time. This is a most gratifying result, testifying eloquently to the splendid performance of the Lowe Observatory refractor in the hands of a trained and skillful observer, as well as to the excellence of the Southern California atmosphere for the most exacting and delicate astronomical observations.

Report of the Secretary of the SOUTHERN CALIFORNIA ACADEMY OF SCIENCES, for the year ending May 4th, 1903.

Los Angeles, Cal., May 4th, 1903.

To the Board of Directors and to the Members of the Southern California Academy of Sciences:

Gentlemen:—I have the honor as secretary of the Southern California Academy of Sciences, to present to you this evening my tenth annual report, in the drafting of which it has been found convenient to divide the subject matter into three particular departments, viz.: General statement of the progress of the Academy, a statement of its financial standing and a statement of its lectures during the past year.

The Academy has prospered in every way during the year. It has become an incorporated society, and plans and preparations have been made to increase even more its activity for good in Los Angeles and the surrounding country. The work done by the various sections has been satisfactory and has been of such a nature that it has attracted many new members into the new incorporation.

The organ of communication between the various sections has been the monthly Bulletin, of which ten issues have appeared during the past year. Mary articles of original investigations have appeared here for the first time, of which the following are, perhaps, the most important:

Contributions to the Lichen-flora of the California Coast Islands.—By Dr. H. E. Hasse.

A new Bee, of the Genus Andronicus.—By T. D. A. Cockerell.

A Monograph on Pecten Aequisulcatus, Cpr.—By Mrs. M. Burton Williamson.

New or Little Know Southern California Plants.-By Le Roy Abrams.

Pandora (Kennerlia) Gradis, Dall.—By Prof. J. J. Rivers.

Hymenoptera of Southern California.—By T. D. A. Cockerell.

Mymicophillous Coleoptera or Ant-Loving Beetles.—By Prof. J. J. Rivers.

A new California Rose.—By S. B. Parish.

Additions to the Flora of Los Angeles County, 1.—By Le Roy Abrams.

Butterfly Emigrants.—By Prof. J. J. Rivers.

The Southern California Species of Calochortus.—By S. B. Parish.

Notes on Sphaeralcea and Malvastrum.—By T. D. A. Cockerell.

Spaerostigma erythra, n. sp.—By A. Davidson, M. D.

Tribal Character in the Separation of the Style-Branches in the Compositae.—By Louis A. Greata.

Pentstemon Parishii, a hybrid.—By Dr. A. Davidson.

Concerning Certain Trees.—By S. B. Parish.

Diptera from Southern California.—By T. D. A. Cockerell.

Two New Plants from Southern California.—By S. B. Parish.

New Plant Records of Los Angeles County.—By Anstruther Davidson, C. M., M. D.

The bulletin has been the means of extending the usefulness of the Academy beyond the sphere of its own members. On its mailing list will be found the leading Scientific Institutions and Libraries in the United States, and some of the prominent ones in Europe.

FINANCIAL STATEMENT.

Balance on hand May 10th, 1902	$ 230.89	
Total collections	548.25	
Gift from President Comstock	25.00	
Gift from Mr. J. D. Hooker to Astro. Section	100.00—	$ 904.14

DISBURSEMENTS.

Rent for hall	$ 142.00	
Commissions on Collections	106.80	
Miss Lawson's Salary	20.00	
Reception Expenses, Music, etc	15.00	
Engraving	12.45	
Lantern	6.00	
One Desk	20.75	
Printing, Publication and Postage	363.90	
Expenses of Incorporation	12.50	
Balance on hand May 4, '03	204.74—	$ 904.14

SUMMARY OF LECTURES
Delivered Before
SOUTHERN CALIFORNIA ACADEMY OF SCIENCES
During Year 1902-1903.

"The Problem of the Universe"—Professor Simon Newcomb.

"Growth of Moulds"—Miss Louise Burns.

"Death Valley, Its Geological Origin, Saline Deposits, Topography, Scenery, Climate and Water Supplies"—Professor G. E. Bailey.

"How to Identify the Forest Trees of Southern California without Being a Botanist"—Hon. Abbott Kinney.

"The Mastodon Bones of Kentucky"—Dr. John Uri Lloyd.

"The mission of the Local Academy of Sciences"—Dr. Theo. C. Comstock.

"Life and Work of Hugh Miller"—Mr. Wm. H. Knight.

"An Outdoor Field Meeting of the Astronomical Section."

"California Mineral Oils and Their Chemical Analysis"—Professor L. J. Stabler.

"Description of Chile, Its Climate, Geology and Topography"—Mr. David C. Cunningham.

"Scientific Relations of the United States Patent Office"—Mr. James R. Rogers.

"Butterflies in This Part of the State"—Dr. Agnes M. Claypole.

"Importance of a Close Study of the Hydra and Its Ability or Inability to Continue Its Life When It Is Turned Inside Out"—Professor Ulrey.

"Hymenoptera of California"—T. D. A. Cockerell.

"Evolution"—Dr. C. A. Whiting, Miss Agnes Claypole, Professor B. M. Davis.

"Radiant Energy"—Professor Edgar Larkin.

"The Comparative Geology of the United States in Comparison with the Eastern, Middle and Western Sections"—Professor F. Lee Fuller.

"Geologic Time and Earliest Stages of the Earth's History"—Professor Theo. C. Comstock.

"Physographic Evolution, Development of Earth's Surface Features"—Dr. Agnes M. Claypole.

"Outline of Evolution of Life' in the Earth"—Professor Theo. C. Comstock.

Notes on Certain Peculiar Ores in Canada and the United States"—Mr. John M. Stewart.

"Recent Siderial Astronomy"—Professor W. J. Hussey.

"Degeneration"—Professor Ulrey.

From the above summary it will be seen that some forty lectures have been given during the past year. The wide range of subjects dealt with comprise: Evolution, Astronomy, Geology, Saline Deposits, Forestry, Palaentology, Botany, Mineral Oils, Biology, Zoology, Physics, Physiography and Psycology.

Large audiences have prevailed, and especially has this been true of the more or less technical section meetings. The meetings both of the Academy and Sections, have all been open to the public, whether members of the Academy or not, a fact which has been appreciated and taken advantage of by many. The influence for good of these meetings in the general uplifting of the community can hardly be over-estimated.

In the opinion of the secretary, no such popular course of free lectures can be found anywhere in the country outside of the city of New York, and even in that metropolis, the popular public lectures under the auspices of the Board of Education are not entirely free.

Considerable expense has had to be met in providing so many lectures without charging any admission. The income of the Academy from dues, which is its only source of revenue, would not be sufficient and there would be a deficiency in the treasury were it not for the voluntary financial assistance of a few of its patrons.

Respectfully Submitted,

B. R. BAUMGARDT, Secretary

Transactions.

Los Angeles, Cal. April 6th, 1903.

The regular monthly meeting of the Southern California Academy of Sciences was held this evening at 940 South Figueroa street.

The chair was occupied by President Comstock. The report of the Board of Directors on the tickets to be voted at the election on the first Monday of May were presented. From this report, the following officers and directors were nominated: President, Theo. B. Comstock, Vice-President, J. D. Hooker; Secretary, B. R. Baumgardt; Directors, Melville Dozier, C. A. Whiting, G. Major Tabor.

A lecture was delivered by Mr. John M. Stewart, entitled, "Notes on Certain Peculiar Ores in Canada and the United States." Mr. Stewart illustrated his lecture with numerous specimens. At the close of the lecture a general discussion followed, participated in by the members present, after which the meeting stood adjourned.

B. R. BAUMGARDT, Secretary.

April 20th, 1903.

The regular monthly meeting of the Astronomical Section was held this evening, Chairman Knight residing.

Without delay, the Chairman, with appropriate remarks relative to the valuable work being performed by Prof. W. J. Hussey at the Lick Observatory, in connection especially with observations of binary stars, introduced that gentleman as the lecturer of the evening.

The address of Prof. Hussey, beautifully illustrated by stereopticon views, was replete with information and interest, lucid in statement and scholarly in style, and was listened to with marked attention by a large audience. After the lecture the professor was asked many questions relative to the subject under discussion, to which his answers were clear and conclusive in all cases where actual knowledge was available.

A brief business session of the Section followed, for the purpose of electing officers for the ensuing year, resulting in the election of Mr. W. H. Knight as Chairman, and Mr. Melville Dozier as Secretary. The meeting then adjourned. MELVILLE DOZIER, Secretary.

Woman's Club House, April 13, 1903.

The minutes of the previous meeting were read and approved.

The first business was thelection of officers for the ensuing year. As a result, Prof. Ulrey, of the University of Southern California, was elected Chairman, and C. A. Whiting, of the Pacific School of Osteopathy, was elected Secretary. The speaker of the evening was Prof. Ulrey, his subject being ''Degeneration.'' The lecture was a scholarly presentation of the subject, and was illustrated by blackboard sketches and microscopical preparations.

The lecture was discussed at some lengthy by a number of the members present.

A paper on ''A New Bee of the Genus 'Andronicus,' '' by T. D. A. Cockerell, was read by title.

About twenty members and visitors were present.

On motion the meeting adjourned. C. A. Whiting, Secretary.

Los Angeles, Cal., April 27, 1903.

Board of Directors of the S. C. A. S.:

Gentlemen:—At the April meeting of the Biological Section of the Academy of Sciences, an election of officers for the ensuing year was held. As the result of that election, A. B. Ulrey was elected Chairman of the Section and C. A. Whiting was elected Secretary.

Very respectfully, C. A. WHITING, Secretary.

Los Angeles, Cal., April 27th, 1903.

The Geological Section met at 940 South Figueroa at 8 p. m. The Chairman, George W. Parsons, being absent, Mr. Wm. H. Knight occupied the chair. The minutes of the previous meeting were read and approved.

Several articles were read by the secretary on the new metal, Radium, supplemented by remarks by the Chairman.

The secretary exhibited a small specimen of Uranium Ore, which was said to also contain Radium.

The Chairman gave an interesting talk on the pre-glacial period, and Mr. Crosby on ''Earthquakes on the Islands in Sicily.''

An election was then held, and George Parsons was elected Chairman, and G. Major Taber, Secretary, for the ensuing year.

G. MAJOR TABER, Secretary.

VOL. II. JUNE, 1903 NO. 6

BULLETIN

OF THE

Southern California Academy of Sciences

CONTENTS:

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MAILED JUNE 30, 1903

BULLETIN
OF THE
Southern California Academy of Sciences

VOL. 2. LOS ANGELES, CAL., JUNE 1, 1903. NO. 6
116 North Broadway

Notes on Plants from Middle Western California.

BY A. A. HELLER.

The following descriptions and notes on the writer's collection of 1902, made chiefly in the counties of Sonoma and Lake, are offered preliminary to a full report on the season's work, which he hopes to publish before the end of the present year. The collection is a large and interesting one, consisting of over 1000 numbers, among them some twenty species that appear to be new, and which have already been distributed under the names they will bear when described.

DICHELOSTEMMA VOLUBILIS. (Kellogg.)

Macroscapa volubilis, Kellogg. Pacific, June 30, 1854.

Stropholirion Californicum, Torr. Pac. R. R. Rep. **4**; 149. 1857.

Rupalleya volubilis, Moriere. Bull. Linn. Soc. Norm. **8**: 313. 1863.

Dichelostemma Californica, Wood. Proc. Phila. Acad. 1868: 173. 1869.

Brodiaea volubilis, Baker. Journ. Linn. Soc. **11**; 377.

No. 5499, collected in Berry Canyon, twelve miles southeast of Chico, Butte county, May, 1902, where it is not uncommon in thickets and on stream banks. This pink-flowered twining species is apparently congeneric with the blue-flowered ones, first separated by Kunth under the name **Dichelostemma**, as pointed out by Mrs. Curran in Bull. Cal. Acad. **1**: 149, 1885.

HOOKERA SYNANDRA, sp. nov.

Stems slender, purplish, about 3dm. high from a fibrous-coated corm; fully developed umbel about 7cm. long, the

pedicels ascending, incurved, subtended by conspicuous, scarious, ovate, acuminate bracts marked by three or more reddish veins; perianth 3cm. long, very slightly constricted above the ovary, the tube greenish, a little over 1cm. long, segments oblong, violet, somewhat spreading, marked with a dark midvein, the outer ones blunt, about 4mm. wide, the inner ones acute, somewhat narrower; staminodia erect, white, 2.5cm. long, closely investing the stamens, and slightly exceeding them.

No. 5742, collected at the Petrified Forest, Sonoma county, June 23, 1902, growing in dry, open gravelly ground. It resembles **H. coronaria** outwardly, but in that species the staminodia lie against the lobes of the perianth, and consequently stand entirely away from the stamens. The present species and **Brodiaea Purdyi**, Eastwood, Proc. Cal. Acad. II. **6**; 427, **pl. 58** 1896, are the only ones in the genus so far noted which have the staminodia erect and closely investing the stamens. The perianth of **B. Purdyi** is rotate, a point which is hardly shown in either the description or the plate. It is very abundant in the valleys among the foothills near Chico, Butte county, the type locality, where it was collected by the writer, under No. 5524.

✓ TRITELEIA ANGUSTIFLORA sp. nov.

Scape erect from a deep-seated, heavily coated fibrous corm, about 3dm. high, but occasionally much taller; involucral bracts lance-acuminate, 1-1.5cm. long, veined; umbel 5-15 flowered, pedicels 1.5cm. long; perianth deep indigo-blue, about 2.5cm. long, narrow funnelform, slightly unequal below, the segments about 1cm. long, the outer ones narrower than the inner, acute; the inner obvate-spatulate, obtuse; anthers versatile but erect, unequally inserted, those opposite the outer segments an anther-length shorter than the others.

No. 5728, collected on Tiburon peninsula along the Bay road, Marin county, June 19, 1902.

Technically there is little to distinguish this species from **T. laxa,** but in the field it is evidently distinct. It begins to bloom at least a month later, has a smaller, less flaring flower, of a rich, deep indigo-blue, and is more confined to wooded banks and slopes. It was first noted on the slopes of Tamalpais above Mill Valley, and is plentiful throughout Sonoma county in favorable situations.

TRILLIUM GIGANTEUM. (H. & A.)

Trillium sessile var. **giganteum**, H. & A. Bot. Beechy, 402. 1841.

Trillium sessile var. **angustipetalum**. Torr. Pac. R. R. Rep. **4**: 151. 1857.

Trillium sessile var. **chloropetalum**, Torr. l. c.

Trillium sessile var. **Californicum**, Wats. Proc. Am. Acad. **14**: 273. 1879.

That the Californian plant is distinct from **T. sessile** of the Atlantic seaboard is evident, but whether its various forms, founded on the color and shape of the flower segments, are worthy of distinctive names is doubtful, for plants with both mottled and unmottled leaves, as well as perianth segments of different shapes and color may be found growing in close proximity. The writer has seen only purple and white flowered forms, but in the dried state the delicate flowers of some of the white ones have assumed a greenish tinge. No. 5035. It is common in Sonoma county on rich, moist banks. The original of Hooker & Arnott was the purple flowered form, collected by Douglas, probably near San Francisco.

ALSINE GLUTINOSA, sp. nov.

Stems rather weak but ascending, 2-4dm. high, loosely branched throughout, the branches slender, divaricate, viscid pubescent; leaves sessile with a clasping base, varying from narrowly lanceolate below to ovate-lanceolate in the middle and upper portion, all more or less acuminate, sparingly short hairy and cilate, the largest 7cm. long, 2cm. wide; flowers solitary in the forks of the branches and in terminal two or three flowered cymes with long internodes; calyx about 4mm. long, glandular, or the lobes nearly glabrous, these oblong or lance-oblong, barely acute; petals ovate-spatulate, nearly twice as long as the calyx, notched; stamens 10, anthers brownish; styles 3.

No. 5880, collected in grassy woods near Summit Lake, Mt. Sanhedrin, Lake county, July 15, 1902.

This species is related to **A. Jamesiana** of the mountains of Colorado, and passes for that species in California, but differs in several particulars, notably in the shape of the petals. These are "oblong . . . cleft about one-third their length, the lobes oblong and obtuse." It has a leaf with "margin glandularly pubescent," which is not the case in our species.

ARENARIA GREGARIA, sp. nov.

Perennial, densely tufted, the parts above ground more or less purplish, covered with glandular, spreading hairs;

rootstocks somewhat lignescent, frequently 2-3dm. long; stems 1dm. high or less, the older ones slender and dichotomously branched above, the younger ones stouter; leaves 3-7mm. long, fascicled and oblong on the young shoots; on the older branches lanceolate, acute, opposite; sepals 4-5mm. long, lanceolate, acuminate, 3-veined, the midvein especially prominent; petals white, slightly exceeding the calyx.

No. 5892, collected on open, stony slopes near Summit Lake, Mt. Sanhedrin, Lake county, July 15, 1902. It is abundant, growing in dense mats, often carpeting the ground in suitable situations. In California, at least, it has passed for **Arenaria verna hirta.**

ERIOGONUM SMALLIANUM. sp. nov.

Perennial, the lignescent part of the stem gnarled and prostrate, covered with brown, flaky bark, sometimes very short, or sometimes a decimeter or more in length; stems of the season with a maximum length of about 2dm., two or occasionally umbellately branched above, clothed with a close lanate pubescence; leaves basal, obovate or obovate-spatulate, the largest about 13mm. long, including the petiole of 2-3mm., densely covered with a felt-like mat of hairs, especially the lower side, which is white, the upper greenish; umbels simple, one to three rayed, the peduncles 1-3cm. long; involucres calyx-like, densely wooly, about 4mm. high, the short segments barely acute; flowers sulphur yellow with a midvein orange or red, on slender pedicles of 1mm., the segments about 5mm. long, 2 mm. wide, obovate, rounded, or sometimes acutish, the stipitiform base about one-fourth the length of the segments.

No. 5996, collected in open, stony ground, near the summit of Mt. Sanhedrin, Lake county, July 28, 1902, and distributed as **E. croceum.** Small but differing from that species in its lower, more cespitose growth, denser pubescence, fewer and more simple umbels on stouter peduncles, etc. **E. croceum,** originally collected by Mrs. Heller and myself on the "breaks" of the Salmon river, northern Idaho, probably does not occur in California, although plants similar to our type of **E. Smallianum** have been labeled as such.

DELPHINIUM LUTEUM, sp. nov.

About 3dm. high, somewhat branched; stems with very few short hairs, purplish; leaves deep green, mostly basal, none exceeding the inflorescence, the blade orbicular in outline, about

6cm. in diameter, 5-parted into broad cuneate segments, these unequally 3-5-lobed, shortly mucronate, sparsely short hairly on both faces; the long petioles broadened below into a somewhat sheathing, ciliate base; flowers pale yellow, pubescent, 3cm. long, half of that length occupied by the stout, straight or only slightly curved horizontal spur; the divisions broadly obvate, regular, the mouth about 2cm. across.

No. 5256, collected on grassy slopes about rocks, near Bodega Bay, along the road leading to the village of Bodega. A well-marked species, its nearest relative being **D. nudicaule.**

CRATAEGUS GAYLUSSACIA, sp. nov.

A slender tree about 20 feet high, with gray bark, the young twigs reddish; branches slender, rather remote, wide spreading; thorns stout, scattered, 1cm. long; leaves pubescent above, with short appressed hairs, especially on the veins, especially on the veins, glabrous or nearly so beneath, those on the young shoots broadly ovate, about 4cm. long, 3cm. wide, acuminately tipped, irregularly serrate and somewhat three-lobed, the teeth callous tipped; the leaves of the older growth obovate, cuneate, 3-4 cm. long, including the slender petiole of 5mm., irregularly serrate, the teeth sharper and closer than on the leaves of the young shoots, the end commonly broad, but occasionally pointed; fruit purple-black, small, about 4mm. in diameter, surmounted by the five short, obtuse calyx lobes; in size and general appearance much resembling the common black huckleberry of the East, whence the specific name.

No. 6052, in fruit only, collected in thickets in low ground along the Lagoon at Sebastopol, Sonoma county, August 20, 1902. Heretofore this distinct species has passed for **C. rivularies,** Nutt., collected originally by Nuttall in the Rocky Mountains of Montana, the type of which is preserved in the herbarium of Columbia University, New York City, and is quite different from our California plant.

MENTZELIA PINETORUM, sp. nov.

Annual; 4-6dm. high, pale and somewhat shining, especially below; pubescent with short hairs; branched from the base, the branches ascending, rather weak; lower leaves oblong, with a maximum length of about 8cm., 1cm. wide, shallowly sinuate, narrowed below to a clasping base, usually blunt, the upper successively shorter and somewhat broader, becoming sessile, the ones contiguous to the inflorescence ovate and half as broad as long, acute; calyx only 1mm. long, the lobes

oblong, obtuse; corolla 4mm. long, canary-yellow, the lobes oblong; filaments not dilated; capsule narrowly linear-clavate, 2.5cm long; seeds in a single row, short-prismatic, the angles and one side grooved, apparently not tuberculate.

No. 5910, collected on the southerly slope of Mt. Sanhedrin, Lake county, July 19, 1902, on the ridge above the sawmill. It grew in abundance in dry, gravelly ground near pine trees. Although distributed as **M. integrifolia** (Wats.) Rydb., it is evidently distinct from that species, the original of which came from the Rocky mountains, or perhaps from Idaho, if "663 Geyer" is taken as the type, and is said by Watson in Bot. King Exped. 114, to have "flowers and fruit as in the ordinary **M. albicaulis,**" the petals of which are described as "scarcely exceeding the short subulate-lanceolate calyx-segments."

New Plant Records for Los Angeles County, Part III.

BY ANSTRUTHER DAVIDSON, C. M., M. D.

Cyladenia venusta, Eastwood. San Gabriel Peak. (Russell.) San Antonio Mt. This has previously been reported as C. humilis Benth. and though smaller than the type it undoubtedly is **venusta.**

Harpagonella Palmeri, Gray. Avalon. (Grant).

Krynitzkia Californica, Gray. Gardena. (Braunton.)

Mimulus rubellus, Gray. Wilson's Peak. (Russell.)

Verbena Wrightii, Gray. Lamanda Park. A single clump of this common Arizona species was discovered by Russell at Lamanda Park.

Mentha rotundifolia, L. Los Angeles River. Braunton.)

Amaranthus deflexus, L. Redondo. (Greata.)

Amaranthus chlorostachyus, Willd. Vernon. (Braunton.)

Aphanisma blitoides, Nutt. Redondo.

Chenopodium rubrum, L. Occasional in alkaline soil near the coast.

Atriplex Parishii, Wats. Redondo. (Braunton.)

Batis maritima, L.. Terminal. (Grant.) Newport.

Eriogonum Parryi, Gray. Rock Creek.

Eriogonum Palmeri, Wats. Rock Creek.

Roubieva multifida, L. Pasadena. (Grant.) Studebaker.

Hesperocnide tenella, Torr. Griffith Park. (Braunton.)

Brodiaea laxa, Benth. North slope Cahuenga Mts.

Juncus xiphiodies, Meyer. Rivera. (Braunton.)

Carex siccata, Dewey. Frequent near Los Angeles and Santa Monica.

Pellaea Wrightiana, Hook. San Antonio Canyon.

Additions to the Lichen-flora of Southern California.
Part III.

BY DR. H. E. HASSE.

Buellia petraea albinea, Tuck. Yosemite Valley.

" triphragmioides, Nyl. N. sp. So named by Dr. Nylander in 1898, without a diagnosis.

Thallus effuse rugulose pulverulent, light yellowish grey. Apothecia black, flat with a thin black margin, disk indistinctly pruinose, finally becoming larger convex, imarginate and epruinose. Dark within. Asci oblong, 76-82 mmm long, 16-20 mmm thick. Hymenium of equal height with Asci. Paraphyses slender, agglutinated Epithec, fuscous and granulose. Hypthecium dark brown. Spores in eights, broadly fusiform or oblong 4-5 septate, 26 mmm long, 8 mmm thick.

On Rhamnus integrifolia, beach, near Santa Monica.

" Bolanderia, Tuck. On granite, San Gabriel and San Bernardino Mts.

" atro-albella, Nyl. Rocks, Catalina Island.

" fusco-atra, (L.) Fr. Rocks, Elsinore.

" parasitica, (Fl.) Th. Fr. On thallus of Pertusaria globifera.

Opegrapha vulgata, Ach. On Quercus agrifolia. SMR.

" vario. var. lichenoides. (Pers.) f. chlorina, Jatta. Teste Zahlbruckner, (Bull. Torr. Bot. Cl. XXVII, 1900. On Umbellularia Californica. SMR.

" UMBELLULARIA, A. Zahlbr. sp. nov. (Bot. Centralbl. XIII, 1902.) On Umbellularia Californica, SMR.

Platygrapha HYPOTHALLINA, A. Zahlbr. sp. nov. (Bull. Torr. Bot. Cl. XXVII, 1900). Schistose rocks, Catalina. (Trask.)

" PLURILOCULARIS, A. Zahlbr., sp. nov. (Bot. Centrlbl. XIII, 1902). Catalina, on Rhus integrifolia.

Chiodecton OCHROLEUCUM, A. Zahlbr. sp. nov. (Bull. Torr. Bot. Cl. XXVII, 1900.) On Rhus integrifolia, Catalina Island. Trask.

Arthonia RHOIDIS, A. Zahlbr. sp. nov. (l. c.) Catalina Island, Rhus laurina.

" LECANACTIDEA, A. Zahlbr. sp. nov. (l. c.) Beach bluffs near San Pedro. On Lycium Californicum.

" patellulata CAESIOCARPA, A. Zahlbr. var. nov. (Bull. Torr. Bot. Cl. XXVII, 1900.) On Malvastrum Thurberi. SMR.

" microspermella, Willey. (Syn. Arthonia H. Willey, 1890.) On Salix lasiolepis, Platanus racemosa and Juglans Californica. SMR.

" galactitella, Nyl. On Apricot and Oleander, Soldiers Home Grounds.

" taediosa, Nyl. (Willey's Syn. Arth.) On Platanus, SMR.

" gregaria (Weig.) Kbr. (A. cinnabarina, Wallr.) Spores 22-24 mmm long, 8-9 mmm thick, oblong, 3-4 sptate, upper cell largest. Catalina, on quercus tomentella. (Trask.)

" impolita subfusca, Nyl. (Willey, Syn.) On Juglans Californica. SMR.

" sanguinea, Willey. (Synop. l. c.) Catalina, on Heteromeles.

" pyrenuloides, Mull. Arg. (Willey l. c.) On Grevillea robusta, Soldiers Home grounds.

" gyalectoides, Mull. Arg. (Willey l. c.) Catalina Island, on Heteromeles.

Arthothelium PRUINASCENS. A. Zahlbr. sp. nov. (Bull. Torr. Bot. Cl. XXVII, 1900.) On Malvastrum Thurberi, SMR.

Endocarpum WILMSOIDES. A. Zahlbr. sp. nov. (Bot. Centralbl. XIII, 1902.) On argillaceous rock. SMR.

" MONICA, A. Zahlbr. sp. nov. (l. c.) on argillaceous rock, SMR.

Verrucaria peloclita, Nyl. (Lichen Flora Gr. Bri., 1879.) Macroscopically is similar to V. plumbae, but differs in the smaller spores. On argillaceous rock. SMR.

Verrucaria DACRYODES, Nyl., sp. nov. So named by the late Dr. Nylander in 1898. "E Stirpe V. polysticta."
Thallus crustaceous, areolate, dull, greenish black. Apothecia small, dull black, partly imbedded in thallus. Spores obovate, 14-17 mmm long, 11 mmm thick. Paraphyses gelatinous ,indistinct. On calcareous rock. SMR.

" DISCORDANS, Nyl. n. sp. Named by Dr. Nylander in 1898. "Stirpis propria." Thallus crustaceous, finely areolate, dull black. Apothecia minute black, imbedded in thallus. Paraphyses slender. Spores broadly eliptic,simple colorless, 21 to 25 mmm. long and 11 mmm. thick. On oaks, western slope of San Gabriel Range at 1000 Met. alt.

Hassea bacillosa (Nyl.) A. Zahlbr. nov. gen. Bot. Centralblatt XIII, 1902. This is Verrucaria bacillosa, Nyl., of the list of Lichens of So. Cal. of 1898.

Microglaena SYCHNOGONOIDES, A. Zahlbr. sp. nov. (l. c.) On Quercus agrifolia, SMR., the original locality, and on oaks, western slope of San Gabriel Range, along Wilson's new trail.

" Hassei, A. Zahlbr. sp. nov. l. c. On Juglans Californica, SMR. Distributed as Pyrenula thelemorpha, Tuk.

Thelopsis SUBPORINELLA, Nyl. sp. nov. Name without description by the author of the species. (Bull. Torr. Cl. XXV, Dec., 1898.) Original locality, Malibu canyon, SMR., on Umbellularia.

Dermatocarpon ACAROSPOIDES, A. Zahlbr. sp. nov. Bot. Centralblatt, 1902. Palm Springs.

Arthopyrenia PARVULA, A. Zahlbr. sp. nov. l. c., Palm Springs.

Psorotichia SQUAMULOSA, A. Zahlbr. sp. nov. l. c. Palm Springs.

PREHISTORIC FAUNA OF CALIFORNIA.

PLATE 5.

Pliocene and Cretaceous Fossils recently described by Dr. J. G. Cooper. *

57. **Planorbis pabloanus,** Cooper.

58. **Anodonta lignitica,** Cooper.

59. **Limnaea contracosta,** Cooper.

The three above named species were found in a bed of laminated lignite, discovered about 1868 by Dr. Cooper and the writer, along the westerly branch of San Pablo Creek, Contra County, California.

The lignite is supposed to have been deposited in a Pliocene lake. On the east are deposits of marine Miocene fossils, on the west altered Cretaceous rocks with "Aucella Piochii." The coal-strata have evidently been uplifted to an angle unusual in Pliocene deposits, but there is nothing to fix the date of the volcanic outburst which is seen in Rocky Mound, three and a half miles distant.

60. **Amnicola Yatesiana,** Cooper. Magnified five diameters.

"This little shell is found in great numbers in Pliocene deposits on both sides of San Francisco bay, at Mission San Jose, on the east (the original locality), also near Stephen's Creek, and near Los Gatos on the west. Carninifex Newberryi and other living species occur with it in localities, also some species that may, like this be extinct. Mr. Watts obtained specimens taken from an artesian well at Lambertson's, Tulare County, 1, 058 feet deep."

61-62. **Cucullaea Bowersiana,** Cooper. Cretaceous. Orange County, California.

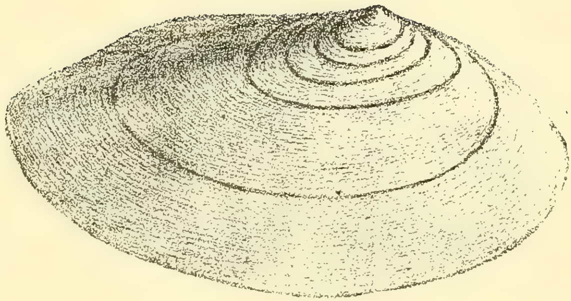
63. **Agasoma kernianum,** Cooper. Pliocene: Kern County, California.

64. **Mytilus dichotomus,** Cooper. Cretaceous "B." Coal Mines, San Diego County, California.

* Bulletin No. 4. Cal. St. Mining Bureau, 1894. (loc. cit.)
59-60—Fresh water shells. Pliocene.
61-62 and 64.—Cretaceous. 63 Tertiary.

PLATE 5.

57



58

59

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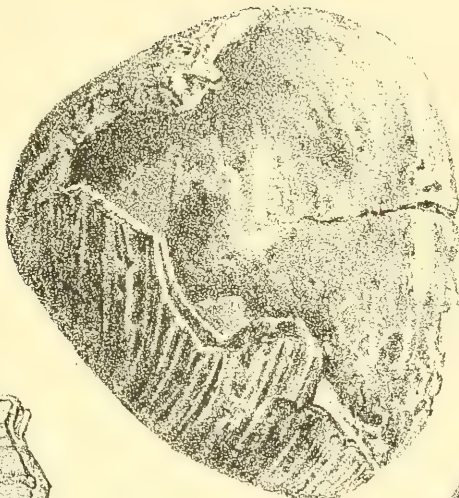

61

63

62

64

The Caterpillar Plague.

BY PROF. J. J. RIVERS

The caterpillar that has caused so much damage to cultivated plants throughout Southern California is that of **Vanessa caryae** (the West Coast Lady) a sister to the ''Painted Lady.'' The ordinary food plant of this insect is the common mallow (Malva pariflora) which, having become exhausted, the caterpillars sought other foods, and failing to find plants of the order Malvaceae they indulged in indiscriminate nibbling of that which was unsuitable, and there followed in consequence Bacterial diseases, which caused death to a large proportion of the brood, through an attack of Flacherie. This is one way of reducing the over balance of the species in the butterfly state. Nearly all the species of the Vanessida are common this season, and several in profusion. The abundance in some years, and scarcity in others is readily accounted for by the working of parasitic influences. The butterfly can exist without the parasitic fly, but the parasite cannot live without the butterfly. The scarcity of the butterfly is followed the next season by the scarcity of the parasite, and when the parasite becomes more numerous, then the following season the butterfly becomes fewer in numbers until in a few seasons the parasite is also reduced to the lowest number consonant with existence. This state of things goes on alternating indefinitely.

Notes and News.

In the Sacramento mountains of New Mexico, **Stipa Vaseyi** is locally known as ''sleppy grass'' on account of its soporific effect on horses and cattle grazing thereon. It has been known by this name for many years. Vernon Bailey writes in ''Science, March, '03, of his experience with a team which fed on this plant. All were affected with sleepiness, and in one the stupor lasted three days. The native stock horses and cattle, after one experience, will not again partake of it. When a full meal is partaken of, the animals are reported to remain in a stupor for a week or ten days. Mr. Bailey ate a handful of the rice-like seeds but observed no effect.

We beg to remind our readers that subscriptions for 1903 are now due.

From the Technological Museum, Sydney, N. S. W., there has just been issued an exhaustive treatise on the chemical constituents of the

Eucalyptus. Of the existing 120 species, 110 have been examined. In one no essential oil was discovered, and in nine instances the specimens were not sufficient for examination. In the others the composition of the essential oils from any particular species was always found to be constant independent of the habit of the plant. This constancy of the chemical constituents has been used as an important means of identification of the many doubtful species in this complicated group of plants. It was also found that while the value of the official oil is usually understood to depend on its eucalyptol content, so far nothing very certain is known as to which is therapeutically the most important constituent.

The Balata tree, which grows abundantly on the upper reaches of the Amazon is reported to be capable of furnishing an unlimited supply of gutta-percha at a fraction of the cost of rubber.

Geological Section.

Los Angeles, Cal., May 25th, 1903.

The Geological Section met at the Woman's Club Rooms at 8 p. m. Chairman Geo. W. Parson called the meeting to order. Minutes of previous meeting were read and approved.

The Chairman introduced Mr. F. C. Crosby of Washington, D. C., who gave a very interesting description of earthquakes, and also report of an inspection of the ruins of Pompeii, which has been uncovered, and a brief history of the several volcanos around that section of the Mediterranean Sea.

A vote of thanks was tendered him for his very interesting lecture. The Chairman announced that the Academy would have a vacation for two months.

G. MAJOR TABOR, Secretary.

Dr. W. L. Jepson of the Department of Botany of the University of California and A. V. Arnold of the Department of Agriculture will conduct a course of Lectures on Forestry at Idyllwild, San Jacinto mountains, California, from July 29 to August 10.

The course will consist of ten lectures by each of the instructors from the University, in addition to any that Mr. Pinchot can be prevailed upon to give. Dr. Jepson will treat the subject from a botanical standpoint, explaining and illustrating the biology of trees, with special reference to their life-history and botanical character; he will also describe the trees and forests of California. Professor Stubenrauch will deal with the economy of forests, their uses and abuses, silvicultural methods and problems of afforestation and reforestation. The lectures will all be of a popular nature, and will be fully illustrated by means of charts and lantern slides, as well as by the materials at hand, as found in the forests surrounding Idyllwild. As opportunity may afford, excursions will be made into the local forests.

1. **Life-history of a Tree.**—Dr. Jepson.
   Four lectures on the activities, structure, and methods or reproduction of a typical forest tree.

2. **Classification of Forest Trees.**—Dr. Jepson.
   Three lectures on the classes of forest trees and their salient peculiarities.

3. **Forests of California.**—Dr. Jepson.
   Three lectures on the forest regions of California, their composition and relation to altitude, rainfall and temperature.

4. **The Practice of Forestry.**—Professor Stubenrauch.
   Four lectures on the general principles and fundamentals of forestry.

5. **Silviculture.**—Professor Stubenrauch.
   Four lectures on silvicultural methods, natural and artificial regeneration of forests, propagation, planting and thinning.

6. **Afforestation and Reforestation.**—Professor Stubenrauch.
   Two lectures on the treatment of barren or cut over areas, with special reference to conditions in California.

Fee.—The tuition fee will be six dollars. The payment of this entitles the student to admission to all of the lectures and to join in all field work of the class. For further information concerning the work and the means of reaching Idyllwild on San Jacinto Mountain, address Recorder of the Faculties, University of California, Berkeley, Cal.

In accordance with the usual custom, the Academy of Sciences will not hold any regular meetings in the summer months. The publication of the Bulletin will also be discontinued during the next three months. On October 1st our members may expect the next issue.

Academy of Science.

Los Angeles, Cal., June 1st, 1903.

The annual reception of the Southern California Academy of Sciences was held this evening at 945 Figueroa street.

President Comstock occupied the chair.

An outline statement of the plan and scope of the Southern California Academy of Sciences was presented by the President, after which followed short verbal reports of the respective sections. The Secretary announced donations to the Academy, one hundred twenty-five dollars ($125.00).

A lecture was delivered by Mr. B. R. Baumgardt on, "Late Results in Celestial Photography," illustrated with a number of celestial photographs taken at the Lick and Yerkes Observatories.

A reception by the members to their friends and visitors closed the exercises of the evening.

B. R. BAUMGARDT,
Secretary.

VOL. II. OCTOBER, 1903 NO. 7

BULLETIN

OF THE

Southern California Academy of Sciences

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BULLETIN

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Southern California Academy of Sciences

VOL. 2. LOS ANGELES, CAL., OCT. 1, 1903. NO 7

A Few New or Rare Southern California Plants

BY S. B. PARISH

DRABA CUNEIFOLIA SONORAE. D. Sonorae, Greene, Bull. Cal. Acad., 2:59. The only Californian station given for this plant in the Synoptical Flora is "Chollas Valley near San Diego." However, it is probably widely spread in Southern California. We have it from Los Angeles (Davidson), Riverside (Hall), and near Colton (Parish). Watson maintained it on the stellate hairs of the pod, in distinction from the simple hairs on the pod of the Nuttallian species. But in our specimens the same pod commonly has a commingling of simple, 1-2 branched, and stellate hairs in varying proportions. Even the remaining character, "racemes nearly sessile," is inconstant, as they often are more or less leafy below. The variety, **integrifolia,** Wats., is a form of sterile soils, distinguished by its small size, and the absence of hairs on the pods. We have it from Santa Monica (Hasse), and San Bernardino (Parish)."

AMARANTHUS DEFLEXUS, Linn, Sp. Pl. 222. This Southern European plant, which has been reported in this State only from the Bay Region, was collected in June, 1902, at Los Angeles, by Mr. Ernest Braunton.

BRANDEGEA PARVIFLORA. Watson ex Rose, Contr. U. S. Nat. Herb. 5:120. The type of this species was collected in 1879 by Mr. W. G. Wright, in West Canyon, at Palm Springs, in the Colorado Desert, not "near San Bernardino," as erro-

PLATE 2.

a—Branch. *b*—Banner. *c*—Wing. *d*—Keel. *e*—Stamens. *f*—Pistil. *g*—Calyx laid open. *h*—Immature fruit. *i*—Leaf.

a is drawn two-thirds natural size, the others are enlarged four-fifths.

PLATE 2.

Dalea Saundersii Parish.

neously stated in Watson's original description. *It was collected also by Parish at the same time and place.

Since that time it has remained otherwise unknown, until May of the present year, when it was rediscovered by Dr. A. Davidson, in Martinez Canyon, near Thermal, in the Colorado Desert, at no great distance from the type station.

DALEA SAUNDERSII.

A shrub 6-10dm. high, the old bark smooth and gray, the new growth sparsely hirsute; glands few, prominent and prickle-like; leaflets 2-3 pairs narrowly lanceolate to oblanceolate, 5-15mm. long, the margins revolute; flowers in a narrow elongated raceme, short pedicellate, 1cm. long, "ultra-marine blue;" calyx 5mm. high, its teeth shorter than the tube, acute, the upper pair broadened at base, ciliate; style hirsute, becoming 1cm. long; ovules 4.

Collected in desert sands, near Victorville, cir. 3,000 ft. alt., in the Mojave Desert, May 12-14, 1903, by Mr. C. F. Saunders.

This bright flowered shrub adds another species to Watson's section Xylodalea, so well represented in this region, but is abundantly distinct. It may bear the name of its discoverer, the author of many agreeable papers on the aspects and phenomena of nature. The type material has been divided between the Gray Herbarium, and the herbaria of Messrs. Saunders and Parish.

KRYNITZKIA UTAHENSIS, Gray. Syn. Fl. 2, pt. I :427 (Supp.) **Eritrichium holopterum submolle,** Gray l. c. 394. **Cryptanthe submollis,** Coville, Death Valley, Rep. 166. Ord Mountain in the Mojave Desert; collected by Mr. Leech. Previously collected in California only by Mr. Colville in the Panamint Mountains, with whose specimens our's entirely agree.

VERBESINA DISSITA, Gray, Proc. Am. Acad. 20:29. Robinson Ib. 34:352. Collected near Arch Beach, Orange County, May, 1903, by Mrs. M. F. Bradshaw. Previously known only from Lower California.

* Proc. Am. Acad. 17:373.

New Bees from Southern California and Other Records

BY T. D. A. COCKERELL.

HALICTUS PETRELLUS, n. sp.

Female length about 7mm., with quite abundant white hair; head and thorax dark yellowish-green, abdomen ferruginous; strongly suffused with blackish at base, sides and apex; legs black, hairy, tarsal joints (especially the hind ones) tipped with ferruginous hairs on inner side; tegulae translucent pale ferruginous, not punctured; wings rather greyish; strongly iridescent, nervures and stigma dark brown. Head longer than broad, face narrowed below; anterior half of clypeus shining black, posterior part green and granular, the middle reddish; face and front dull and granular; some distinct punctures on each side of the antennae; antennae black, flagellum ferruginous beneath, scape long; mesothorax dull and granular, with very numerous small punctures, no distinct median groove; enclosure of metathorax covered with minute weak rugae, hardly visible on the posterior part, and not bounded by a sharp rim; hind spur of hind tarsi with four teeth, the two basal ones very long; abdomen dullish, with extremely minute punctures. Closely allied to **H. nymphalis**, Smith (Florida specimen from Mr. Robertson compared), but larger, with dark stigma and nervures, and anterior edge of clypeus not testaceous.

Hab.—San Pedro, Calif., July 11, 1901. (Cockrell). Belongs to **Chloralictus,** Robertson.

HALICTUS CATALINENSIS, n. sp.

Female length about 6½mm., robust and thickset; head and thorax dark green; abdomen broad, black with a distinct brassy lustre, hind margins of the segments with bands of fulvous-tinted hair, apex clothed with the same; legs black, with yellowish hair; hind spur of hind tibia with few and large, but short teeth; tegulae shining dark reddish-brown; wings greyish, stigma dull fulvous; third submarginal cell much

longer than second; second nearly square. Head very large, face very broad; front with excessively close punctures; mesothorax with close small but strong punctures; base of metathorax with a fine but dense radial sculpture; first segment of abdomen very closely but strongly punctured. Closely allied to **H. fasciatus**, Nyl. and **H. meliloti**, Ckll., but easily known by its very broad face and darker tegulae and wings. It is true that such differences in the breadth of the face occur elsewhere in the restricted genus **Halictus** within specific limits, so it may be that **catalinensis** is only a subspecies of **H. Meliloti**; but as the three specimens seen are similar, and I know of no intermediates, I leave the Catalina insect as a species.

Hab.—Avalon, Catalina Island, California, Aug., 1901. Collected by Miss Ada Springer. Three females.

DIPTERA.

The following have been kindly determined for me by Mr. Coquillet:

Paragus tibialis, Fallen; La Jolla.

Eristalis tenax, L., **Zeuxia rufonotata**, Bigot, **Ophyra leucostoma**, Wied. and **Lipochaeta slossonae**, Coq., all from San Pedro.

HEMIPTERA.

Narnia pallidicornis, Stal, **Rasahus thoracicus**, Stal, and **Melanolestes abdominalis**, H. S., all from San Pedro; kindly determined by Mr. Heidemann.

On the cliffs at San Pedro, **Isomeris arborea** is abundantly infested by a nearly black variety of **Murgantia histrionica**, which may be called var. **nigricans**.

CRUSTACEA.

The following, collected at San Pedro, have been kindly identified by Dr. Benedict of the National Museum.

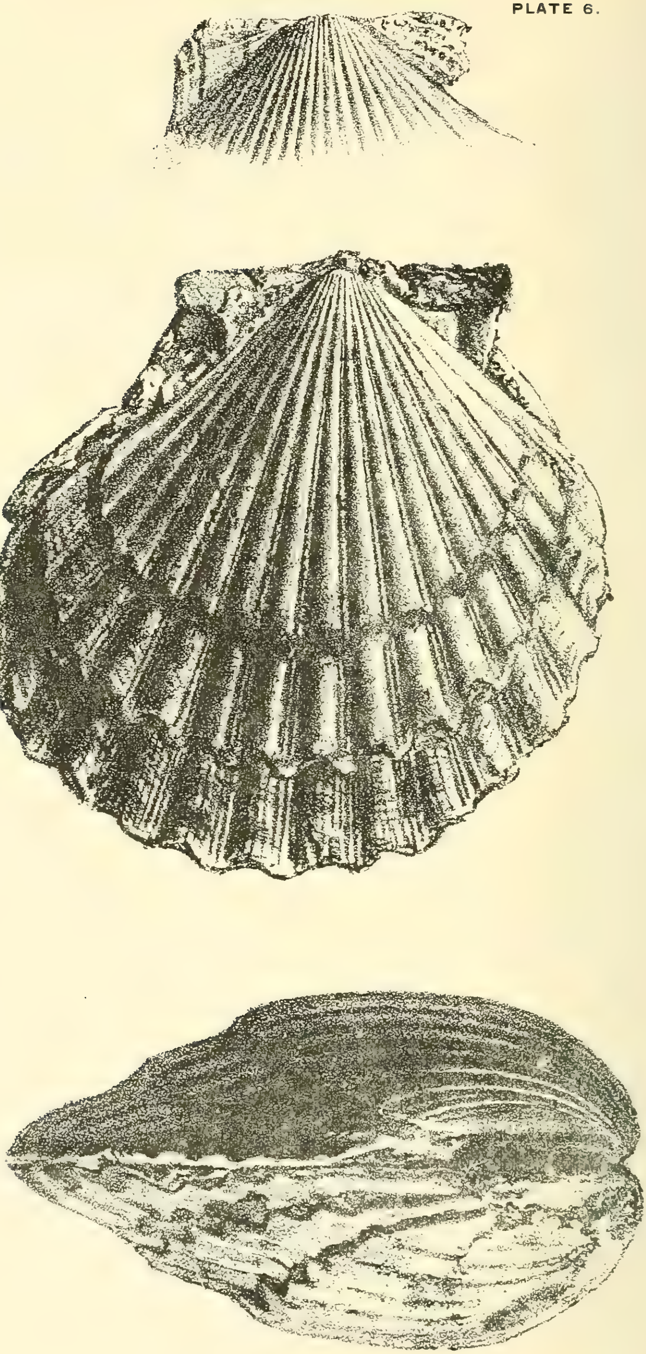
Lepidopa myops, Stimpson.

Blepharopoda occidentalis, Randall.

Pagurus confinis, Benedict.

Emerilia analoga.

PLATE 6.



Tertiary.

Prehistoric Fauna of California

PLATE 6.

65-67 **Pecten** (Liropecten) **estrellanus,** Conrad. Tertiary.

Liropecten estrellanus, Con., Pacif. R. R. Report, Vol. VI, 1850, p. 71, pl. 3, fig. 15. Vol. VII, p. 191, pl. 3, figs. 3, 4.

P. crassicardo, Con., Proc. Phil. Acad. Nat. Sc., Dec. 1862, p. 291.

Spondylus estrellanus, Con., Pac. R. R. Rept., Vol. VII, p. 191, pl. 1, fig. 3.

Liropecten estrallanus, Con., L. crassicardo, Con., L. volaeformis, Con., Proc. Phil. Acad. Nat. Sc., 1862, p. 291.

Pecten pabloensis, Can., Pac R. R. Rept., VI, P. 71, pl. 3, f. 14.

Dr. Cooper is of the opinion that these figures on plate 6, from two specimens, show the combination of characters assigned by Conrad to three species, and that all the above-named species may be classed under two, P. estrellanus and P. pabloensis. (See Bulletin No. 4, loc. cit.)

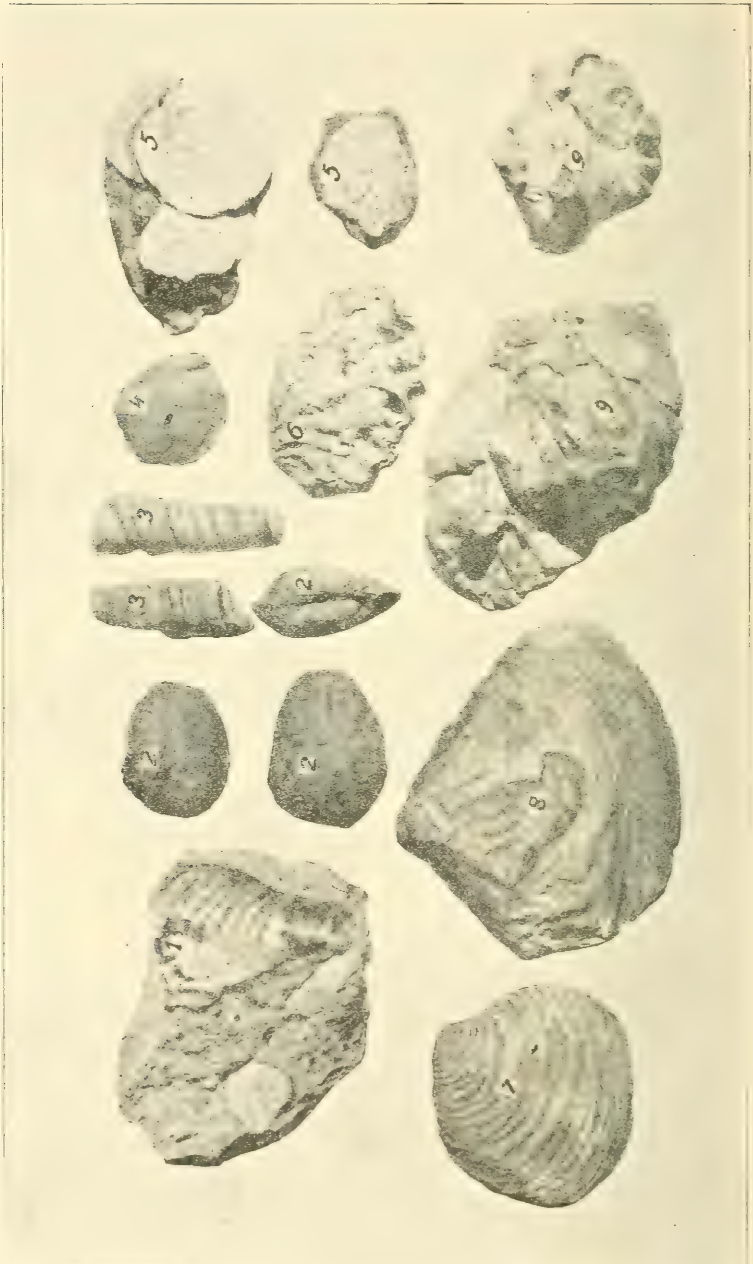
PLATE 7.

Pliocene Fossils from San Miguel Island, California:

1. **Mytilus californianus**, Conrad.
   Quaternary?
2. **Clementia subdiaphàna**, Carpenter.
   Three specimens.
3. **Turritella Hoffmani**, Gabb.
   Two specimens.
4. **Conchocele disjuncta,** Gabb.
5. **Clypeaster Gabbi,** Remond.
   Two specimens.
6. **Ostraea Veatchii,** Gabb.
7. **Callista** (Amiantis) Callosa, Conrad.
8. **Standella californica,** Conrad.
9. **Turbinella caestus,** Broderip.
   Two specimens.

(The above-named fossils were collected by the late C. D. Voy, and determined by Dr. Cooper. Voy's manuscript has no reference to the figures. The writer having collected the same species, together with others not represented on the plate, several years previously, is enabled to determine the species from the illustrations.)

PLATE 7.



Pliocene Fossils from San Miguel Island, California.

PLATE 8.

Prehistoric Fossils from Santa Rosa Island, California:

10. **Saxidomus Nuttalli,** Conrad.

11-12. **Callista** (Amiantis) **Callosa,** Conrad.

13. **Lucina Borealis,** Linnaeus.

14. **Turritella Hoffmani,** Gabb. Four specimens.

15. **Mactra** (Harvella) **Elegans, Sowerby.** Now living at Panama only.

16. **Glycimeris Generosa,** Gould. Two specimens.

17. **Hinnites Crassa,** Conrad. Three specimens.

18-20. **Ostrea Veatchii,** Gabb.

21. **Pecten pabloensis,** Conrad.

22-23 **Liropecten Estrellanus,** Conrad. (See foot note to Plate 6.)

24. **Turbinella Caestus,** Broderip. Found living on Mexican coast.

The Pliocene or Later Tertiary Period

The Pliocene Period of the history of California appeals more strongly to the inhabitants of the State than do all the other geological periods "since the world was made."

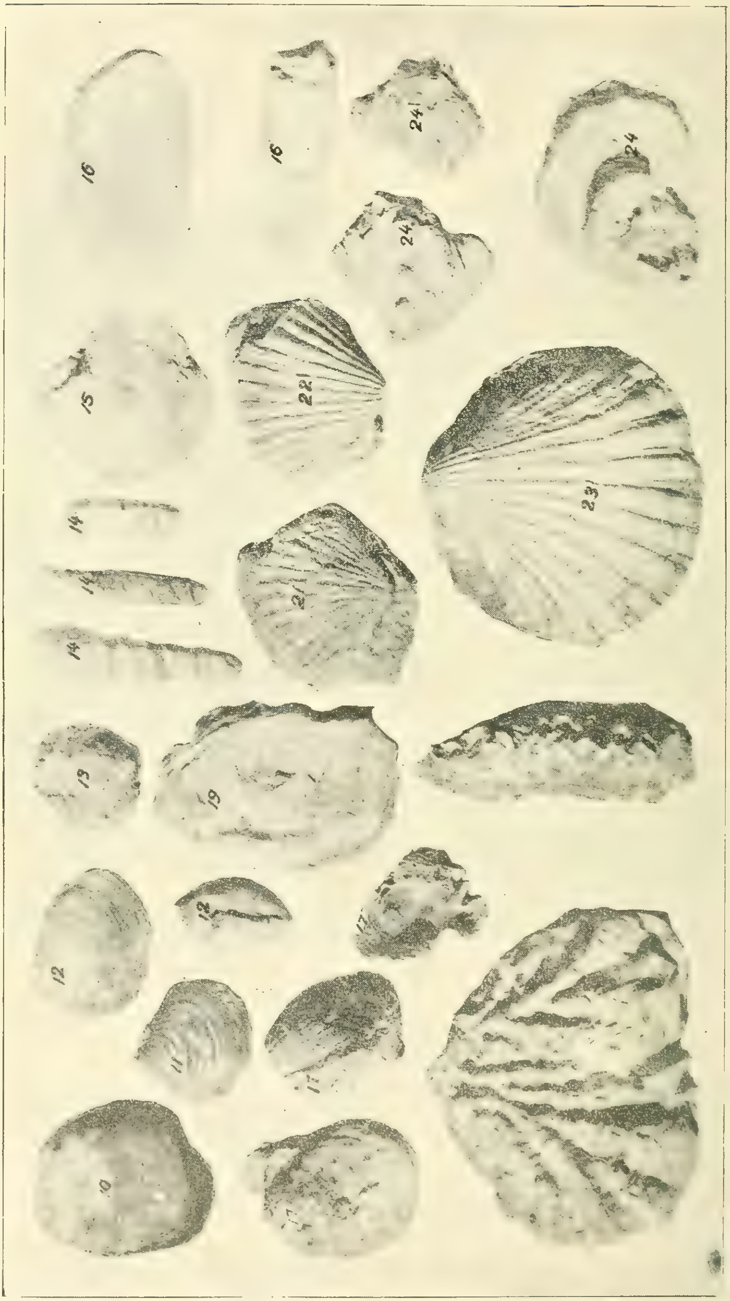
First—Because from its deposits the larger part of the immense quantities of gold produced in this State have been drawn for more than fifty years.

Second—The Pliocene Gravel Beds are the burial places of large numbers of the huge tertiary Mammals represented by the extinct Elephant and Mastodons.

We find that, in some unaccountable manner, our territory was suddenly invaded by armies of huge tropical mammals, whose fossil remains have been found in large numbers imbedded in the gold-bearing gravel of the flanks of the mountains, the beds of the "dead rivers" of the Pliocene age, and the later lacustrine beds and diluvial deposits of the entire area of California.

How came they here? Were they the progenitors of the same genera now living in Asia and Africa, whose descendants

PLATE 8.



Pliosene Fossils, Santa Rosa Island, California.

migrated from this continent to those far distant tropical regions? Or, did they come from those regions by way of some land connections which have since been obliterated by cosmic changes? With a few exceptions we know of no animals which have lived on this continent from which by any known law or process of evolution, they could have come. Nor have they left any descendants which can in any way be traced back to them as progenitors.

One of the above named exceptions is the Horse, whose original home seems to have been on this continent, and of which family nearly fifty fossil species have been found in the United States. These have been traced back to the time when they had three, four and five toes to their feet. Some of the species referred to were only two feet high, and one, the Eohippus of Marsh, was no larger than a fox, and is the oldest known animal of which is clearly referrable to the horse family.

The evolution of this animal has been clearly traced through the Eocene, Miocene and Pliocene periods, but it seems to have disappeared at some time during the Quarternary. It probably migrated to other continents by the route followed by other animals in coming to our continent, as it was only re-introduced in America since written history began.

PROTOHIPPUS.

Two species of the Protohippus (allied to the horse) have been found in California, one named Protohippus insignis, by Leidy, beneath the lava of Table Mountain, Tuolumne County, at a depth of two hundred and ten feet; another at a depth of sixty feet in Southern California, is probably a different species. (Dr. J. G. Cooper).

MASTODON.

The writer in his explorations in Central California discovered two or more species of the Mastodon in rocks of Pliocene age. The other large mammals treated of in this chapter were, mostly, so far as known, confined to the Quarternary, or Post-Tertiary.

It is possible that some of the extinct animals whose remains have been found in Quarternary deposits lived in Plio-

cene times, and that their remains were carried from their original resting places and subsequently deposited in the later lacustrine beds, and diluvial deposits of Post-Tertiary age, or in the deposits of our present water courses. Numerous incidents of this character have been noted by the writer. Some of these will be referred to in the consideration of Man and his Contemporaries. In consequence of this uncertainty as to the epochs in which these animals lived, it is impossible to follow well-marked lines of demarcation between the Pliocene and Post-Pliocene, or Quarternary, and I will not attempt to confine the consideration of the animals of those epochs within such lines.

Other animals of the Pliocene and Quarternary disappeared from our continent at about the same time as did the horse.

The Mastodon, Mammoth, the American Elephant, Rhinoceros, Tiger, Camel and Hippopotamus, all of which formerly inhabited California, are now represented by other species of the same genera living in the tropical regions of the Old World.

In the absence of satisfactory proof that the large mammals above-named originated on this continent, we are obliged to consider them as having migrated from the Orient, probably from Southwestern Asia and Africa (where their ancestral forms have been found in the Tertiary formations), by way of a land connection where the Bering Straits now separate America from Asia.

That typical generic forms of animal life did not originate on more than one of the great continents contemporaneously, but were disseminated from one common center, has been demonstrated by scientific research, and it is probable that our large extinct tropical mammals migrated from their original homes during periods when there was land communication between the Oriental Continents and America.

The Mammoth (Elephas primigenius) being fitted for life in the temperate, or still colder regions, remained in the high latitudes. The American Elephant, Mastodon, Rhinoceros, Hippopotamus, Tiger and other tropical animals migrated further south, where subsequent changes probably caused their extinction on this continent.

The differences between the fauna and flora of North and

South America were largely consequent upon the absence of dry land connection between the two continents. The presence of marine Miocene formations throughout the tropical regions of Mexico and Central America prove that the two continents were not connected until the Pliocene, or possibly later; and even then, the extensive areas of swamps and marshes would have prevented the migration of large land animals in that direction. On the other hand, we find that the Elephant and Mastodon were distributed over what is now the entire temperate region of North America, from the Pacific to the Atlantic.

We also find that, unlike the Miocene fauna the Pliocene shows that the animals of that time inhabited both the Eastern and Western slopes of the mountain ranges, causing the fauna of California to resemble that of the "Bad Lands" of Nebraska and other regions.

Publications Received

"The Melon Plant-house and the Manteca Disease," Timely Hints for Farmers, No. 46, Agricultural Experimental Station, University of Arizona.

"Experiment Station Record," No. 7, Vol. 14, U. S. Department of Agriculture.

"How the Mangrove Tree Adds New Lands to Florida," by O. P. Phillips. Reprinted from The Journal of Geography, No. 1, Vol 2.

Bulletin of the New York Botanical Garden, No. 8, Vol. 2.

Proceedings of the Nineteenth Annual Convention of the Association of Official Agricultural Chemists," Bureau of Chemistry Bulletin, No. 73, U. S. Department of Agriculture.

"Algae of Northwestern America," with eleven plates, by W. A. Setchell and N. L. Gardner, Botany, Vol. 1, pp. 165, 418, University of California Publications.

"A Study of Cider Making," U. S. Department of Agriculture, Bureau of Chemistry, Bulletin No. 71.

"Experiments in Orchard Culture," Maine Agricultural Experiment Station, Bulletin No. 89.

"The Water Contents of Creamery Butter," U. S. Department of Agriculture, Bureau of Animal Industry, Circular No. 39.

"Resistant Vines and Their Hybrids," University of California Agricultural Experiment Station, Bulletin No. 148.

"The Chinch Bug in Maine," Maine Agricultural Experiment Station, Bulletin No. 91.

"Minerals from Leona Heights, Alameda County, California," by W. T. Schaller, University of California, Geology Bulletin, Vol. 3, No. 7.

"Palacheite," by A. S. Eakle, University of California, Geology Bulletin, Vol. 3. No. 9.

"Plumasite an Oligoclase—Corundum Rock, near Spanish Peak, California," by Andrew C. Lawson, University of California, Geology Bulletin, Vol 3, No. 8.

"Two New Species of Fossil Turtle from Oregon," by O. P. Hay; "A New Tortoise from the Auriferous Gravels of California," by W. J. Sinclair; "New Ichthyosauria from the Upper Triassic of California," by J. C. Merriam, University of California, Geology Bulletins, Nos. 10, 11 and 12, of Vol. 3.

"Studies of Mexican and Central American Plants," by J. N. Rose, Part 1, Vol 8, of Contributions from the U. S. National Herbarium.

"Culture Work at the Substations," 1899-1901, Bulletin No. 147.

"The California Sugar Industry," Bulletin No. 149.

"The value of Oak Leaves for Forage," Bulletin No. 150, University of California.

Transactions, September, 1903.

ACADEMY OF SCIENCES.

Los Angeles, California, September 7, 1903.

The first regular meeting of the Southern California Academy of Sciences for the year 1903-1904 was held this evening at 940 South Figueroa street. President Comstock occupied the chair. The evening was devoted exclusively to a lecture by Alvin H. Low, Esq., a well-known attorney of Los Angeles, California. The subject dealt with was "Scientific Commercial Standards." The following is a brief abstract:

Fixity, said the lecturer, is the first requisite of a standard of length, weight, capacity or value. Absolute fixity is scientifically impossible, but practical fixity is attainable.

The Congress is empowered by the Constitution "To coin money, regulate the value thereof and of foreign coin, and fix the standard of weights and measures," and it is its duty to do so. Congress has been slow to exercise this sovereign function. Most of the weights and measures now in use are so by sufferance, the several states and territories having exercised a right both as to weights and measures, and to interest, not contemplated by the Constitution and to the great confusion of commerce. Congress has, however, legalized the Metric system, which should be made compulsory and exclusive.

Money is the measure of value, and its value should be as fixed and certain as the measure of length. Notwithstanding recent improvements our money system, fundamentally, remains the most barbaric and antiquated of all the measuring systems in use. Congress has at last

established the gold dollar piece as the standard unit of value and the touchstone for all other kinds of money, but has done nothing or worse than nothing towards regulating or fixing its value. The value of money, like that of every other article of commerce, is subject to the law of supply and demand, which is as much a natural law as that of gravitation.

Interest is the premium paid for the use of money, and the rate of interest indicates the ratio between the supply of and demand for money. There is no fixed value to money while interest varies as to time or place. A variable rate of interest is not creditable to a just money system. Fixity in value and elasticity in volume to meet the demands of commerce are prime requisites of a scientific money system. In place of this we have elasticity in value to meet the demands of money-lenders, to whom is intrusted the only means of regulating both the value and the volume of money—the issue of coined credit—paper money, now used under a special license of the government, as a device for charging interest on what the money-lenders owe. Congress should reclaim these sovereign prerogatives from the states and the banking associations and, coining all the credit as well as the metal money, provide means for its issue to the people at a just and fixed rate of interest and compel all other money-lenders to conform to the same rate, leaving the demands of commerce alone to determine the volume.

The lecture was followed by an interesting discussion, after which the meeting stood adjourned.

B. R. BAUMGARDT, Secretary.

ASTRONOMICAL SECTION.

September 21, 1903.

Chairman Knight introduced the exercises of the evening by a brief discussion of the facts relative to Borelly's comet, recently observed, illustrating his remarks by a diagram on the blackboard.

The discussion was participated in by Mr. Baumgardt and Prof. Larkin.

Mr. Knight also gave some interesting facts relative to the return of Brooks' comet, the most striking fact being that, notwithstanding the absence of the comet for the past seven years, it was discovered within five minutes of arc of the place at which it was predicted to appear, a remarkable illustration of the accuracy of astronomical calculations.

Chairman Knight then took up the question of the white spot on Saturn, showing that its apparent motion on the surface of the planet, as observed by Prof. Barnard, had introduced a doubt as to the time of rotation of the planet, which, however, is still believed to be between ten and eleven hours.

Prof. Larkin was then introduced and proceeded to address the Section on Ether and Gravitational Matter through space. His remarks

were based upon an article in the Scientific American, written by Sir Wm. Thompson, and were replete with mathematical intricacies, though highly interesting.

After a few remarks by the Chairman concerning the present favorable attitude of Jupiter for observation, the meeting adjourned.

MELVILLE DOZIER, Secretary.

GEOLOGICAL SECTION.

Los Angeles, Cal., September 28th, 1903.

The Geological Section met at the Woman's Club rooms at 8 p. m.

Chairman George W. Parsons called the meeting to order.

The minutes of the last meeting were read and approved.

The Chairman introduced Julius Koebig, Ph. D., as the speaker of the evening. Prof. Koebig then addressed the meeting, taking for his subject "The Deposits of Alkaline Salts," giving a history of all of the well-known deposits of the world, and explained their method of formation. He also stated that the alkaline salts of the world were important factors in many articles of commerce, giving several interesting illustrations of the fact. His remarks were full of interest and a vote of thanks was tendered Prof. Koebig for his lecture.

G. MAJOR TABER, Secretary.

BIOLOGICAL SECTION.

September 14, 1903.

The first meeting of the new year was called to order by the Chairman, Prof. A. B. Ulrey.

Dr A. D. Houghton, the speaker of the evening, was introduced by the Chairman, who spoke on the breadth and scope of Biology.

The lecture of the evening was on the Cactacea, and was illustrated by a magnificent collection of the plants. It is only just to say that the lecture was of high character, and that it means a great future for this section, if it "sets the pace" for the present year.

The lecture was discussed at some length by Dr. Davidson, and a considerable number of questions were asked of the speaker.

About forty members and visitors were present.

The Section adjourned to meet again on October 12th.

C. A. WHITING, Secretary.

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VOL. 2. LOS ANGELES, CAL., NOV. 1, 1903. NO. 5

PREHISTORIC CALIFORNIA.

(Continued from October BULLETIN.)

BY DR. LORENZO GORDIN YATES.

PREHISTORIC FAUNA OF CALIFORNIA.

EXPLANATION OF PLATE IX.

(From "Contributions to the Extinct Vertebrate Fauna of the Western Territories," by Professor Joseph Leidy.)

Figs. 1-2. **Mastodon obscurus,** Leidy:
Last lower molar of the left side, natural size, Specimen discovered by Dr. Lorenzo G. Yates, in Contra Costa County, California, and now in the Museum of Amherst College, Massachusetts.
Fig. 1. View of the triturating surface.
Fig. 2. Outer view of the same specimen.

TERTIARY AND QUATERNARY MAMMALS.

Tiger—Prof. Joseph Leidy in his "Contributions to the Extinct Vertebrate Fauna of the Western Territories," (which forms the first volume of the Final Reports of the United States Geological Survey of the Territories, under F. V. Hayden), says: "Among a collection of fossils belonging to the cabinet of Wabash College, Crawfordsville, Indiana, purchased from Dr. Lorenzo G. Yates, there are several which were kindly loaned to me for investigation. The specimens consist of jaw-fragments of a large wolf and tiger." The fossils are not petrified, and indeed have undergone almost no alteration, and are probably quaternary. He names the species of tiger **Felis imperialis,** and further says: "The specimen indicates a species as large as the largest living Bengal Tiger, and, indeed, is slightly larger than the corresponding part of the largest specimen of a skull among many in the Academy Museum of Philadelphia." The comparative measurements of the fossil as compared with the Bengal tiger from Hindostan are given, showing the larger size of the fossil specimen.

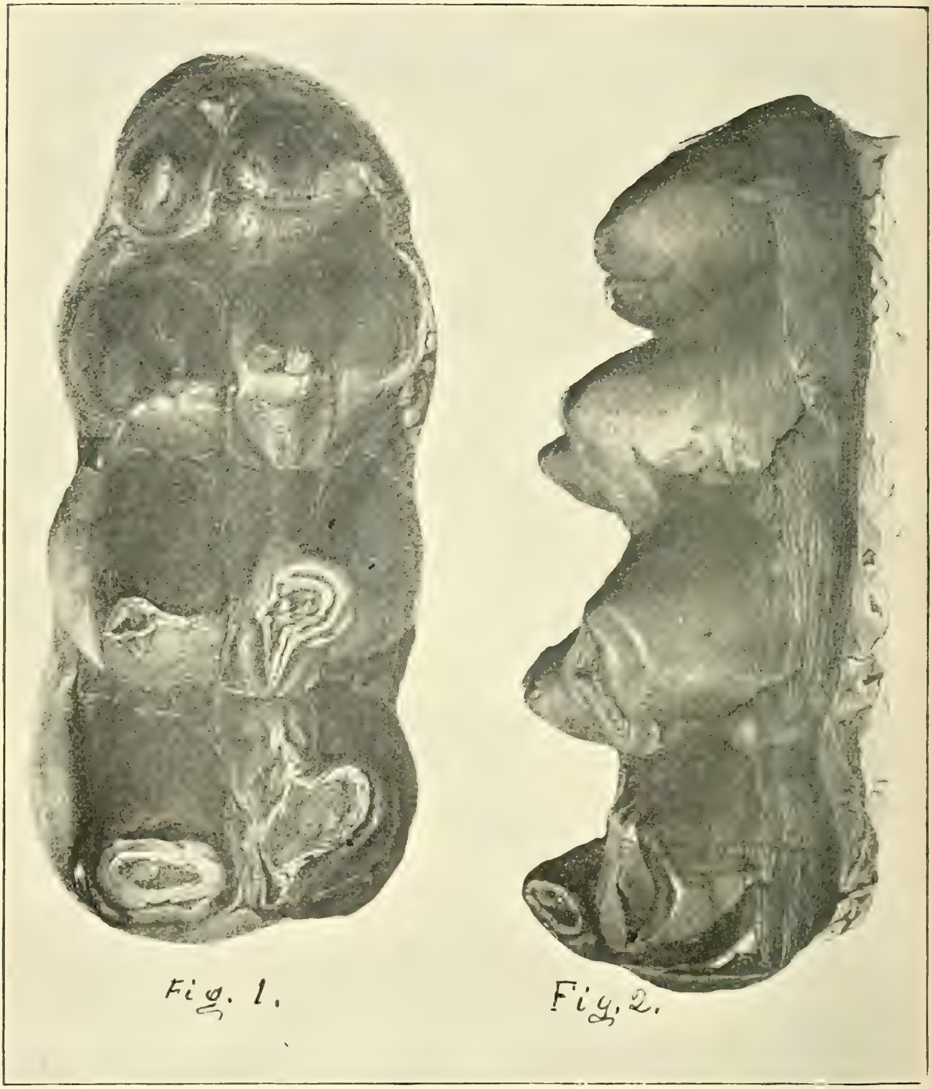

PLATE IX.

Wolf—Dr. Leidy called the wolf **Canis Indianensis** and says: "The fossil specimen pertaining to a wolf consists of a right ramus of a lower jaw. The specimen indicates an animal larger than any individuals of the recent wolves of North America and Europe." The measurements as compared with those of wolves from Oregon and Europe show the fossil to be considerably larger than the living species.

Mastodon—On page 231 of the above named report, Dr. Leidy says: "Dr. Lorenzo G. Yates has communicated to the writer a list of localities in which he has discovered remains of mastodons in that State (California). Specimens collected by him were sent to Professor C. U. Shepard, of Amherst, Massachusetts, who has submitted them to the examination of the author." "One of the specimens, a last inferior molar tooth, represented in figures 1-2, Plate XXI, was found, together with the mutilated lower jaw and upper molars, at Oak Springs, in Contra Costa County. The remains were obtained from the rock at the base of one of the rounded hills, of Tertiary age, mentioned in Professor Whitney's Geological Survey of California, p. 32, stretching along near the edge of the San Joaquin plain. According to Mr. William M. Gabb, the formation belongs to the Pliocene Tertiary period." (See pl. 9.)

"A small photograph, sent to me by Dr. Yates, exhibits the lower jaw without the ascending portions behind, and with straight tusks projecting with an upward direction. The tusks appear to be as long as the jaw was in its complete condition."

Another specimen received by Professor Leidy from Professor Shepard "consists of the fragment of a tusk, from Dry Creek, Stanislaus County, California. It was discovered by Dr. Yates imbedded in the bluff of a hill, about ten feet above the bed of the creek. The hill, upward of a hundred feet in height, is one of those mentioned in Professor Whitney's Geological Survey as being scattered over the San Joaquin plain, at the base of the foot-hills of the Sierra Nevada."

"The specimen XXX is remarkable from its exhibiting characters which indicate the species to have been nearly related with the Mastodon angustidens of Europe."

In the "List of Localities of Fossil Elephants and Mastodons in California," read at a meeting of the Philadelphia Academy of Sciences in 1873, referred to by Professor Leidy, the writer noted nineteen localities of the Mastodon, four of them discovered by himself; nine localities where the fossil elephant (Elephas americanus) had been found in California, four of which were discovered by the writer, at one of which he discovered the large tooth presented on Plate 10.

PLATE X.

PREHISTORIC FAUNA OF CALIFORNIA.

PLATE X.

Upper molar of fossil elephant (Elephas americanus), said to be the largest tooth on record; discovered by the writer in Quaternary deposit; Alameda County, California. A portion of a tusk was found with the tooth, which measured eight inches in diameter, or twenty-four inches in circumference.

DIMENSIONS OF THE MOLAR TOOTH

Length of body of the tooth, 385 millimeters ($15\frac{1}{8}$ inches).

Antero-posterior diameter of grinding surface, 215 millimeters.

Transverse diameter of grinding surface, 100 millimeters.

Weight twenty-five pounds.

Since that time several new localities have been discovered; one on the Island of Santa Rosa, California, where the writer discovered a portion of the tusk of a fossil elephant, and later, Messrs. Voy and Blount found the teeth and bones illustrated on plate No. 10, which were erroneously reported as Elephas primigenius, or "Mammoth."

The latest find which has come to the writer's knowledge is that of some of the vertebrae of fossil elephant, together with other mammalian bones which have not been determined. They were found on the Hope Ranch, near Santa Barbara, while excavating a tunnel to convey water from the Santa Inez Mountains to a lake, under the supervision of Mr. J. K. Harrington, who sent them to the writer for determination.

Fossil Ox.—The fossil ox (Bison latifrons, Leidy), has been found in several localities in California. Two of the last upper molars in the Yates collection are illustrated on plate XXVIII, of Prof. Leidy's Report (loc. cit.). An entire skull excepting the lower jaw was discovered in Alameda County, in close proximity to elephant's teeth and tusks. It had the largest horn-cores of any specimen on record, but unfortunately, when the writer moved to Santa Barbara, the specimen not being packed, was left with a friend. It was afterward accidentally destroyed. Its dimensions, as compared with other skulls, were as follows:

	Fossil Ox.	Living Buffalo.
Distance between base of horn core.	15 inches	12 inches
Length of horn core along lower curvature	24 inches	12 inches
Breadth of occiput	12 inches	10 inches
Depth of occiput	7 inches	6 inches

The horn cores of the fossil were six inches in diameter.

EUVANESSA ANTIOPA l.

BY PROF. J. J. RIVERS.

This native butterfly has been commonly known as the "Camberwell Beauty." It differs in its habits in some particulars from those in the genus **Vanessa**, both structurally and in the habits of the earlier stages. In **Vanessa** the eggs are laid singly and often not more than one on a plant, but in **Euvanessa** the eggs are deposited around a twig in a mass like the egg mass of **Neustria Californica** Pack. The whole hatch approximately at the same time and live socially during the larval stages, when they disperse and form their chrysalids in different situations, which lessens the chances of destruction. The caterpillar feeds upon willow and poplar and some other trees.

If you drive a green willow stake into the wet ground and it puts forth leaves, a specimen of the "Camberwell Beauty" will soon make it a visit, and you will be apt to notice that your willow is being defoliated and that your tree is inhabited by several hundred caterpillars, which are dark in body color with a line along the back, of brick red spots. The caterpillars change in turn to a handsome butterfly as named. In size it is 2.5 to 3.5 inches and is of a dark maroon color, with an outer border of yellowish; inside of this is a line of gemlike spots of blue.

This butterfly obtained the cognomen of the "Camberwell Beauty" because it was the favorite of the London collectors of butterflies. Camberwell being about three miles from London Bridge was famous for its willows, and this butterfly, as well as for its bowling green, hence the well-known locality of Camberwell Green. The growth of London has caused the extinction of the green, the willows and the butterflies. This species, however, is still common in France and other European countries and is common all over the United States of North America. It is double brooded hybernating in the perfect state.

Ocean Park.

RADIUM.

[Extracts from an address before the University Club of Los Angeles, October 8, 1903, by Wm. H. Knight, former President of the Southern California Academy of Sciences.]

Recent discoveries in the chemical and physical sciences have been so rapid and so bewildering that the layman who has only time to glance at a fugitive paragraph here and there, gets but a hasty and confused idea of the nature, significance and importance of these discoveries. He reads of the occult X-ray darting through opaque substances, and after mastering a magazine article or listening to a scientific paper on the subject, gets some adequate notion of the connection between a Crookes tube, a high vacuum, an electric charge, a stream of electrons from the cathode, a soft opalescent light, actinic rays projected beyond the tube, and their power to render sensitive plates phosphorescent.

His mind has hardly grasped the purport of these interesting facts when Monsieur Becquerel, scion of a family of distinguished chemists, informs him that uranium and other elements of high atomic weight, also possess the X-ray power, and because they possess this property they are called radio-active substances. While physicists are busy investigating these mysterious phenomena and reconstructing their chemical theories regarding atoms and the constitution of matter, two hitherto unknown chemists, M. and Mme. Curie, focalize the attention of the world upon themselves by announcing the discovery of a new element which seems to defy the laws of nature by giving forth light and heat without perceptible loss of its substance or chemical change of its particles. This is the wonderful radium.

In order to prepare your minds for an adequate conception of the infinitesimal fractions of matter and time with which our subject compels us to deal, I present some statistics which, though startling, are not more wonderful to contemplate than are the achievements of the human mind, which, by tireless experiments and inexorable logic, has reached these startling conclusions. They impress us with the truth that there is a sublimity in the infinitely minute of physics, not less than in the infinitely vast of astronomical science.

Lord Kelvin gives the number of molecules in a cubic centimetre of air, measuring four-tenths of an inch each way, as twenty millions of millions of millions of oxygen and nitrogen particles. And yet, these innumerable molecules occupy but a fraction of that space, about one-sixteenth of a cubic inch, for they have plenty of room to be in constant motion among themselves, the light shines through them without appreciable obstruction, and if liquified by intense cold they will form an insignificant globule in one corner of the enclosure.

Each particle of air moves on an average, not more than one-100,000th of a centimetre without hitting one of its fellows, and each particle collides with another particle no less than 5,000,000,000 times

every second. These statistics, thus dealing with the infinitesimal in time and matter, are based on well assured scientific data, and are accepted by the leading physicists of the world.

Infinitely small, however, as the molecules of air seem to human comprehension, each one is composed of two or more theoretical atoms clasped in a firm chemical embrace, and till recently these chemical atoms were supposed to be the ultimate, absolutely indivisible particles of matter.

But Sir William Crookes with his vacuum tubes, and Henri Becquerel with his radio-active elements and J. J. Thompson, distinguished Professor of Physics in the English University of Cambridge, have come upon the stage with experiment and hypothesis, and ruthlessly shattered, both the long established theory, and the seemingly infinitesimal atoms, at one fell swoop.

The marvelous discoveries in the realm of physics which have crowded upon each other during the past decade, have not been more astonishing to the intelligent layman who but imperfectly understands their import, than to the man of science who discerns in these new revelations of radiant energy the necessity of laying the foundations of science anew.

Not by any means that the old working formulae are obsolete. Nature does not vary in her methods. The mathematical tables applicable to electrical phenomena, to the stress of building materials, to chemical analysis and synthesis, to the motions of the heavenly bodies, remain in force, and their usefulness is not impaired in the slightest degree. Undeviating uniformity in her processes, is the law of Nature.

As a matter of fact, this recent theory of the divisibility of the so-called chemical atoms, does not do away with the established theory of atomic proportions in the production of chemical compounds. On the contrary, a knowledge of the old theoretical atoms is as essential to the working chemist as it ever was, and the theory of atomic proportions is as much of a verity as it ever was.

The new discoveries regarding electrons, Becquerel rays, and radium emanations, have obliterated no facts, nor have they changed any working formula. What the physicist has learned is, that atoms, though still the bases of chemical compounds, are nevertheless divisible.

But while atoms still retain their technical name, and the chemical formulas remain undisturbed, glimpses of new and startling truths respecting the constitution of matter, chemism, electricity, radiant energy, and the mysterious ether of space, are vouchsafed to the student of physics.

Crookes found that by passing a powerful charge of electricity through a vacuum tube exhausted to one-millionth of an atmosphere, particles of the residual gas are thrown out from the negative pole in streams strong enough to set a finely balanced wheel in motion. These minute particles so projected he called radiant matter, and other physicists have named them ions, electrons, and corpuscles.

Prof. Thomson investigated these rays or electrons and showed that they are particles of matter having a mass only about one-thousandth of that of a hydrogen atom, which has heretofore been looked upon as the smallest particle of matter existing.

Then Wilhelm Roentgen, a German scientist, appeared upon the scene, and showed that certain rays emitted from the Crookes tubes possess the power of penetrating opaque substances. After the discovery of the X-rays all these strange phenomena were studied with yet keener interest, and the nature and origin of the mysterious rays earn-

estly sought by the physicists of the best equipped laboratories of Europe.

Whilst these investigations were going on Henri Becquerel, noticed that certain crystalline compounds, notably the salts of uranium and several other substances found in pitchblende, not only possess the X-ray power, but under certain conditions emit light without sensible heat, and these were called Becquerel rays in honor of their discoverer.

But the close of the nineteenth century was signalized by the discovery of a new and wonderful element which became an epoch-making event in hastening the transition of theories respecting the nature and ultimate forms of matter, from the old to the new views. Two French chemists, Pierre Curie, in co-operation with his Polish wife, obtained from pitchblende a most remarkable element which was not only dazzingly self-luminous, but emitted an X-ray more powerful than those proceeding from a Crooke's tube.

It was appropriately named radium by its discoverers, and is the most striking example of terrestrial radiant energy known. Nearly all the specimens of this substance thus far produced are chlorides or bromides of radium, it being very difficult to obtain the element in its pure metallic state. The substance with which chemists experiment is one of its salts—the chloride of radium. It is a white crystalline powder which glows like melted steel when heated to its highest pitch.

The atomic weight of radium is 225, hydrogen being 1, oxygen 16, iron 56, and mercury 200. Only two known elements have a higher atomic weight than radium—thorium 233, and uranium, 240—both radio-active, and both obtained from pitchblende.

Pitchblende is a remarkable mineral which, though rare, has long been known. It is found principally in Bohemia, and occurs in pitchy black, or very dark, masses. Its principal constituent is the oxid of uranium. The metal uranium was discovered by Klaproth in 1789, but only in recent years was it found to be radio-active. It was then learned that thorium, discovered by Berzelius in 1828, is also radio-active. It was while investigating this property of uranium and thorium that polonium, radium and actinium, were discovered.

One of the most astounding mysteries connected with these radium emanations is their complexity. This element shines by its own light, apparently without any exciting cause; it sends forth a stream of that recently discovered substance, helium, detected by the spectroscope in the sun's corona; and it emits three different kinds of rays, namely:

Alpha rays, easily absorbed by solids, and carrying a positive electric charge;

Beta rays, more penetrating than Alpha rays, and negatively charged; and

Gamma rays, intensely penetrating, and not carrying an electric charge at all.

At the same time, by some wonderful and inexplicable inherent energy, this versatile element maintains a temperature 2.7 degrees F. above that of surrounding objects, or, rather, it imparts that higher temperature to adjacent objects.

To summarize, radium shines with perpetual light, is an inexhaustible fountain of helium gas, emits positive electrical, negative electrical, and non-electrical rays of enormous penetrative power, and is self-heating, whether at ordinary temperatures, or plunged in a bath of liquid air. Truly, the more this element is studied the more marvelous and inscrutable seem its powers.

One of the surprising facts brought out in connection with radio-

active emanations, is their extreme delicacy. The spectroscope tells us what elements are dancing in the flames of a star so distant that its light only reaches the eye through the lens of a telescope, but J. J. Thomson, in his Belfast address, speaking of the ions projected through the glass walls of a Crookes tube and called X-rays, and of other radio-active rays, felt warranted in making the statement that "radio-activity is 5000 times as delicate as the spectroscope, it matters not whether the arc, spark, absorption or phosphorescent spectrum be made use of."

"We have in the radium salts," says Dr. Kauffmann, an eminent German physicist, " a class of bodies which are in the position to throw off electrons without any outside influence. We stand before a perfect riddle as regards the source of energy, likewise of the whole mechanism of this phenomenon, especially as it appears that here velocities have to be treated which are nearly equal to that of light; velocities which we can reach by means of electrical forces, in actual cathode rays, only after overcoming enormous difficulties. Thick lead plates are radiated through at this velocity without a noticeable loss of energy. But just this behavior of the electrons at such tremendous velocities seems suited to furnish explanations in connection with the deepest questions concerning the constitution of the electrons, likewise of the atoms."

Radium emits ions that have a velocity of 120,000 to 130,000 miles per second, and that penetrate solids and blister the flesh. What are ions? Certain substances radiate into space myriads of particles far smaller than the theoretical atom. Corpuscles, they are called by J. J .Thomson, and ions by other physicists. In the new theory of force, electricity, and matter, these ions take the place of ether vibrations in fundamental physics. Sir Wm. Crookes suggests that the energy of radium is supplied by collisions of air molecules with the radium atoms. But the question still obtrudes itself, why are the ions of radium thrown off? Air molecules collide with the atoms of other substances and no such miraculous effect is promised. For the moment the world must content itself by simply stating the facts attending the strange phenomena.

A writer in the Engineer says: "It may perhaps turn out that radium is doing nothing more in one way than a magnet does in another. They both develop energy, apparently without help. Why and how remains to be explained."

Crookes calls attention to some calculations of Johnstone Stoney, showing that an enormous amount of energy is locked up in the molecular motions of quiescent air, amounting to 140,000 foot-pounds in each cubic yard of the atmosphere. He referred to the kinetic energy which impels each molecule to be incessantly bombarding its fellows or the objects in its vicinity, which presses with a force of 15 pounds per square inch upon all bodies at sea-level. Now Crookes conjectured that radio-active bodies of high atomic weight might draw upon this store of energy in some unknown or hitherto unexplained manner.

Though Thompson found by mathematical calculation that there are from 700 to 1000 ions or corpuscles in an atom of hydrogen, and from 100,000 to 150,000 in the atoms of highly radio-active substances, it is not to be assumed that these corpuscles occupy the entire bulk, infinitely minute as it is, of the atom.

On the contrary, these ions may be likened to 1000, or 100,000 particles of dust seen floating in the atmosphere of a small bird cage into which the sunshine is streaming. But they are revolving, with unthinkable velocity, about a common center, in what is called a vortex

motion—the uniformity and intensity of this motion giving to them the quality of rigidity, stability, elasticity, and impentrability, which was formerly supposed to characterize the chemical atom.

Stress in the magnetic field, or violent impact, or intense heat, may cause one of these electrons to leap from among its fellows in the previously stable atom, and then, electrical equilibrium being destroyed, turmoil and confusion prevail in the ranks of the remaining electrons, and disruption, explosion, and atomic disintegration, ensue.

What a sublime thought is embodied in the contemplation of this miniature catastrophe. We may liken the vortex of whirling ions in this atom to the orderly movements of the planets in the solar system, each ion, like each planet, satellite, or comet, performing its revolution in its prescribed course and in its appointed time, in accordance with inflexible law.

A foreign atom, or perhaps a fugitive electron, dashes with corpuscular velocity against the periphery of the vortex, but with force enough to destroy the harmony of this miniature solar system, and one after another of the revolving electrons, deprived of its centripetal governor, breaks from its control, and flies off into space. It may be absorbed by your body, or by the foliage of the tree over your head, or by the vapor of a passing cloud, or, eluding all these sublunary objects, it may dart out into the infinite depths of the universe towards some distant star or nebula, for our sun cannot even slacken its amazing speed, or it may wander for uncounted eons in the black and vacant chambers of unoccupied space.

Radium has the peculiar property of rendering adjacent bodies of whatever nature, temporarily radio-active. You are aware that a steel magnet renders other bars of iron magnetic by coming into temporary contact with them. Here is an analogous property in radium but with a more universal application.

Thus we have seen that atoms can be split into parts—that ions, or electrons, are such parts—and that these parts are carriers of electricity. Or possibly, electricity itself consists of these fractured atoms, flying with inconceivable velocity and force, but moving in accordance with immutable laws which may be studied, recognized, and controlled for uses of man.

And now the question arises: If atoms are thus complex, if each of these extremely minute particles of matter is **not** indestructible and indivisible, but **can** be broken into infinitely minuter particles, each endowed with amazing projectile force, is it not possible that the so-called elementary substances—hydrogen, carbon, iron, gold, and the like—are **not** simple and distinct in their essence, but **are**, in their **ultimate** forms, reducible to a common and universal element?

This opens up a broad and fruitful field of speculation, and we **must** speculate before we can generalize. Out of this mental process of speculation comes a working hypothesis from which we establish a theory that fits all the facts in the case. Speculation, generalization, hypothesis, theory, are the successive stages. But in each stage of inquiry imagination, that wonderful faculty of the human mind, plays a master part.

Sir Oliver Lodge recently said: "Here, then, we appear to have, in embryo, a transmutation of the elements, the possibility of which has for so long been the guess and the desire of the alchemists. Whether the progress of research will **confirm** this hypothesis, and whether any of the series of substances so produced are already familiarly known to us in ordinary chemistry, remains to be seen. It is not in the least likely that any **one** radio-active substance can furnish in its stages

of collapse the whole series of elements; most likely one substance will give us one series, and another substance will give another.''

The flashes of energy produced by an induction coil seemed, formerly, to be dissipated in space. Were they lost? We now know that those impulses are borne in waves that can be received and recorded at a distant station; that wireless telegraphy is simply electro-magnetic radiation into the ether from a metal conductor; that these Hertzian waves can be refracted and reflected as light can be.

But yet, are we quite sure that we know all this? Are these impulses waves, vibrations, oscillations of the ether? Or are they, in the new light that is dawning upon us, are they the material projections of fractured atoms? I must confess that my mind halts on the border line of a tantalizing and perplexing dilemma.

How shall we account for these apparent caprices in the behavior of elementary substances when thus brought into contact in different proportions? We cannot account for it at present. All the light that has come to us in recent discoveries and experiments has enabled us to penetrate the mystery only a very little way. We are, from time to time, adding a little to our knowledge of the processes of nature, but the why, the why, of those processes is a riddle as insolvable as ever.

RECENT PUBLICATIONS.

New or Noteworthy North American Crassulaceae. N. L. Britton and J. N. Rose. Bull. N. Y. Bot. Gard. 3:1-45. Sept., 1903.

Platystemon and Its Allies. Edward L. Greene. Pittonia, 5:139-149. Aug., 1903.

We have here two papers of especial interest to California botanists. In the first a great number of new species are described under fifteen genera. Seven of these pertain wholly, or in part to the Pacific Coast; and but one of them, **Sedum,** is a familiar name. **Tillaea angustifolia,** Nutt., becomes **Tillaestrum angustifolium,** Britt. The flat leaved Cotyledons are referred to a new genus, **Dudleya,** of 59 species, extending from Crescent City to Cape San Lucas. Twenty-nine species represent the development of this genus in Southern California. For the species with terete leaves or semi-terete leaves the genus **Stylophyllum** is provided, and the four already known species are augmented to twelve. **Sedum variegatum,** Wats., becomes the type of **Hasseanthus,** a genus named in honor of Dr. H. E. Hasse, all of whose four species are of Southern California.

The practical usefulness of the paper is lessened by the absence of keys, or a synoptical arrangement of the species. In Dudleya, where most of the new species are segregates of the old ones, it is to be regretted that the authors did not redefine the latter; since after so many subtractions the original descriptions can hardly apply. And when to this is added the assignment of only the vaguest ranges to these species, and the absence of any citation of specimens, one is at a loss to understand

what plants, in the conception of the authors, they are to include. We note (page 18) a slight geographical slip, in taking the Coronado Islands as belonging to California instead of Mexico.

We trust that we may expect, from the ability of the authors, and the resources at their command, a full and systematic monograph of the difficult and neglected family which they have taken in hand.

In Dr. Greene's paper **Meconella** is restored for certain species of **Platystigma**, only one of which, **P. denticulata**, Greene, is southern. For others a new name is proposed, **Hesperomecon**, of which genus a single specimen species, **H. lineare**, Greene, has been collected in Southern California. In **Platystemon** the single representative heretofore recognized, **P. Californicum**, Benth., is restricted to a local maritime plant of Monterey. From the other plants which have been referred to that species, 51 new species, and one variety, are segregated. In one instance, from "a bunch mounted as single specimen," and probably gathered in a single handful, the author was able to disentangle the types of three new species. Fifteen Platystemons are credited to Southern California.

The usefulness of Dr. Greene's paper is enhanced by the provision of keys, so that one is not left to grope his way through the maze of new species without the aid of a clew.

Dr. Greene still recognizes the variety, a category more logically dropped by the author of the Crassulaceae, and by most segregators. It is remarkable that whereas the conception of a species as an abstract idea, and not a concrete entity, is universally accepted, in practice it is more and more defined by the minute description of a particular specimen, to which it is carefully tied. Slight differences, once disregarded as unimportant, or relegated to forms or varieties, now become the bases of species. Systematists may yet be in danger of losing the faculty of generalizing through a too exclusive attention to the study of the individual. S. B. P.

PUBLICATIONS RECEIVED.

"The Milk Supply of Two Hundred Cities and Towns." U. S. Department Agriculture, Bureau of Animal Industry. Bulletin No. 46.

"Wild Rice, Its Uses and propagation." U. S. Department Agriculture, Bureau of Plant Industry. Bulletin No. 50.

"The Use of Branding Fluid." University of Arizona, Agricultural Experiment Station. Bulletin No. 47.

Transactions for October, 1903.

ACADEMY OF SCIENCES.

Los Angeles, California, October 5, 1903.

The Southern California Academy of Sciences met in regular monthly session this evening at 8 o'clock, at 940 South Figueroa street.

President Comstock occupied the chair. No regular business was transacted.

The evening was devoted entirely to a lecture by Professor Larkin, of the Lowe Observatory, who selected the subject of "Radium" for consideration. In an interesting manner all the data available upon this subject were presented and discussed in detail. The lecture was illustrated with physical apparatus, loaned for the occasion by the Los Angeles High School.

Adjourned. A large attendance was present.

B. R. BAUMGARDT, Secretary.

ASTRONOMICAL SECTION.

October 19, 1903.

The Astronomical Section convened at 8 p. m., Chairman Knight presiding.

The subject for consideration was the sun, with special reference to the sunspots now attracting unusual attention. Mr. Knight introduced the subject by reading from current literature several extracts relative to this phenomenon; and also a description of the great dark tube or shed, one hundred feet in length, recently constructed and dedicated for use at the Yerkes Observatory, in connection with the work of determining the phenomena of sunlight as reflected through this horizontal tube by a mirror, and made to pass through a series of lenses.

Dr. John Woodbridge, the lecturer of the evening, was then introduced and read a graphic and instructive paper on the subject, "The Sun as the Furnace and Light House of the Earth," treating the subject under the subdivisions of the sun's distance, dimensions, attractive power, visible features, motions, heat, light, envelopes and eclipses.

A discussion of the subject, emphasizing the spots now prominent, was participated in by Messrs. Knight, Baumgardt, Taber and Hill.

The meeting then adjourned.

MELVILLE DOZIER, Secretary.

BIOLOGICAL SECTION.

Los Angeles, Cal., October 26th, 1903.

The Geological Section of the Academy of Sciences held their regular meeting at the Woman's Club rooms, at 8 p. m.

Chairman Geo. W. Parsons called the meeting to order. Minutes of previous meeting read and approved. The Chairman introduced Mr. C. J. Callahan, M. E., as the speaker of the evening. His subject was the "Origin of Petroleum," and to illustrate the different changes in the formation of oil, he exhibited several specimens, giving the different degrees of heat at the different depths below the surface, and also the oil sand in which the oil had settled after formation.

He gave an interesting description of the oil fields of the East as well as those of California, and stated that there was no danger of

the supply of oil being exhausted, as nature was constantly forming a fresh supply. Questions were asked and answered, and the meeting was interesting and instructive. The Chairman thanked Mr. Callahan on behalf of the Section for his able lecture.

G. MAJOR TABER, Secretary.

BIOLOGICAL SECTION.

The meeting of the Biological Section was called to order by the chairman. The minutes of the last meeting were read and approved. The exercises of the evening consisted of a lecture by Dr. Louisa Burns, of South Pasadena, on The Technique of Blood Examination. The method of enumerating the corpuscles and estimating the haemoglobin was clearly explained and illustrated by a practical demonstration.

This was followed by a talk from C. A. Whiting on the significance of blood examinations. Anemia and the several kinds of Leukemia were discussed.

Dr. B. F. Gamber of Los Angeles was present and followed the lectures with a most interesting and instructive talk along the same lines. Among other facts he stated that in one case studied by him, the removal of the patient from the sea level to an altitude of 7,500 feet increased the blood count from 4,600,000 corpuscles per cu. m. m. to 9,000,000.

The lecture was illustrated by microscope and haemocytometer loaned by the Pacific School of Osteopathy.

About twenty five members and visitors were present.

C. A. WHITING, Secretary.

Woman's Club House.

NOTES AND NEWS.

The plant known as Basil, (Ocimum viride) which was so highly recommended as a mosquito preventative, has proved on investigation to have no value. An equally fallacious belief at one time prevailed with regard to the utility of blue gum trees in making malarious countries healthy.

The gun clubs of our neighborhood might greatly increase the sporting value of the marshes by the extensive sowing of wild rice (Zizania aquatica, L.) so much favored as a food by ducks and other birds of aquatic habits. The U. S. Department of Agriculture has just issued an interesting bulletin on the uses and the propagation of the plant. The mud flats and lagoons of Southern California are eminently suited to the cultivation of the plant.

Science long ago invaded the culinary department of the nursery, but now we have the utilitarian gravely suggesting that the nursery rhymes be made instructive and suggests among others the following modification of "Three blind mice:"

Three blind boils!
See how they run!
They all ran after the farmer's wife
Had cut off their heads with a septic knife;
You never saw such a mess in your life
As three blind boils.

The January issue of the "Fern Bulletin," containing A. A. Eaton's revision of the Genus Equisetum is of more than usual interest to Cal-

ifornians. **E. ramosissimus,** Desf. is given for Los Angeles; the only known locality in the United States. This plant was gathered years ago by Dr. A. Davidson at or near the "half-way house" on the old trail to Wilson's Peak. **E. Funstoni** Sp. Nov. with four varieties all found in Southern California, is the name now given for what has heretofore passed as **E. laevigatum.**

We recently received from Nome an invitation for our Academy of Sciences to attend a meeting of the Alaska Academy of Sciences. At this, their first, meeting, "The Marconi System of Wireless Telegraphy" is to be discussed. Their Charter was closed with 100 members.

In "Science," September 18, may be found the preliminary report of the Marine Biolgical Survey Work carried on by the Zoological Department of the University of California at San Diego, by Prof. Ritter. The results for the funds available, have been large. Many new species among the Radiolaria and other of the lower forms of marine life have been added to our coast lists, and not a few new to science. Investigation of the water in San Diego bay led Prof. Ritter to infer that contrary to the usual belief no large, subterranean body of water enters the bay. The extension of the breakwater at San Pedro will, for a time at least, spoil what was one of the best zoological stations on the coast. In consequence the laboratory will probably be permanently stationed at San Diego. With this end in view some of the more enlightened members of the Bay City have formed themselves into an association for the purpose of raising a permanent endowment fund for marine research.

The first report of the Desert Laboratory, near Tucson, is now in the hands of the publishers. The report will contain a number of illustrations of cacti and other plants native to that region.

From Mr. Alex. Craw's Report to the State Horticultural Commission, it would seem that in **Scutellista cyanea** we have at last found a remedy for the noxious black scale. The reports from every point are all so far favorable. The parasites in question have survived the last winter and have multiplied freely. Should this increase continue we will be spared the extermination of the graceful pepper trees that have been ruthlessly cut down of late because of their harboring the black scale. It is also reported that a parasite has been found in Western Australia that destroys 95 per cent of the Codlin moths.

VOL. II. DECEMBER, 1903 NO. 9

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION
A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER G. W. PARSONS

CONTENTS:

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BULLETIN
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VOL. 2. LOS ANGELES, CAL., DEC. 1, 1903. NO. 9

PREHISTORIC CALIFORNIA.

(Continued from November BULLETIN.)

BY DR. LORENZO GORDIN YATES.

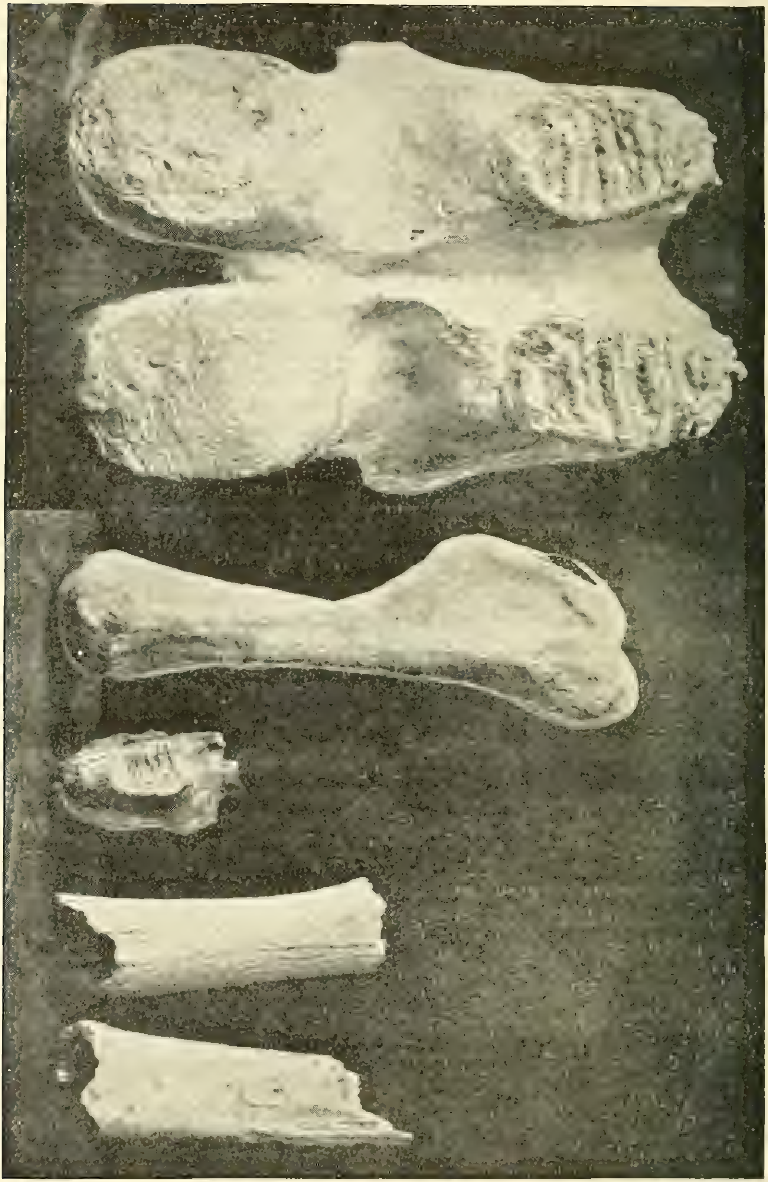
LLAMA,

Auchenia hesterna, Leidy.

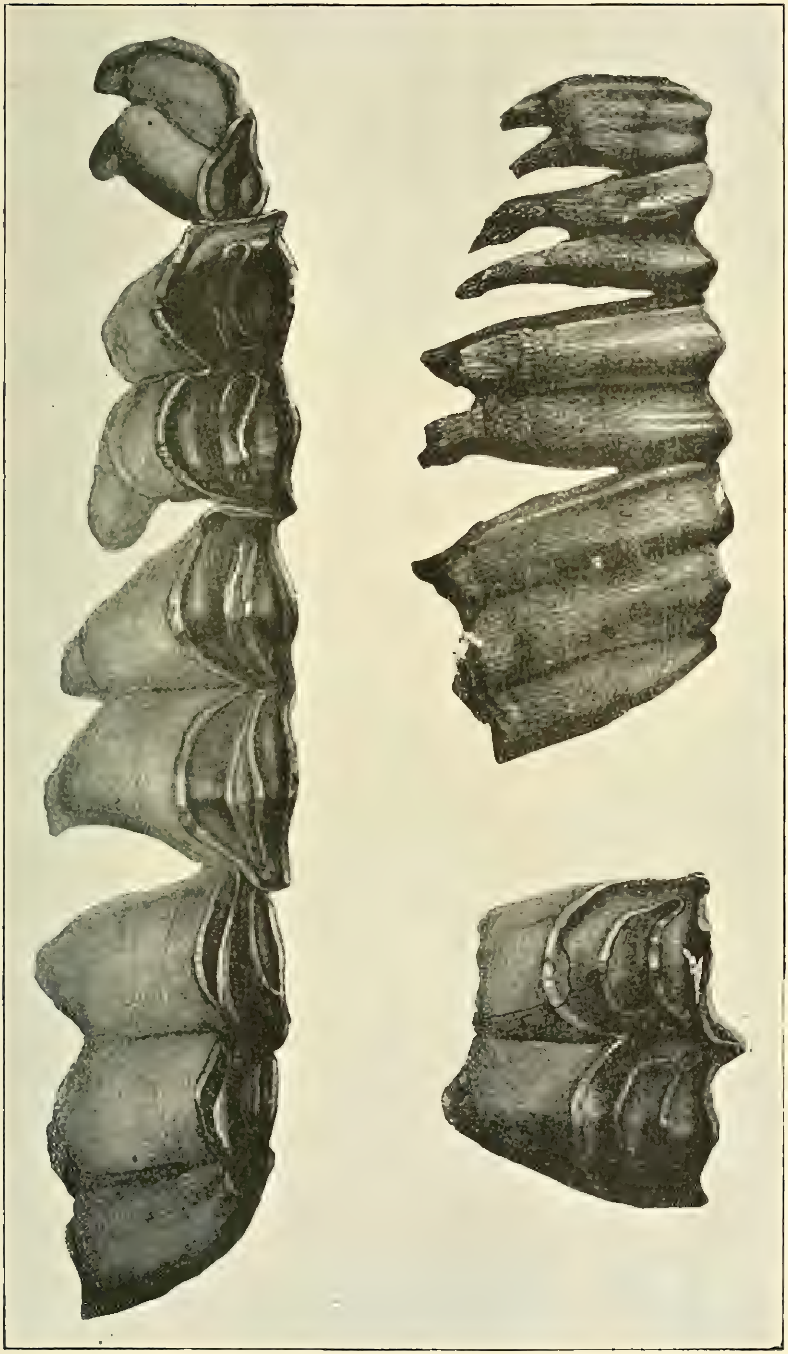
On page 256 of "Contributions to the Extinct Vertebrate Fauna of the Western Territories," (loc. cit.), Dr. Leidy says: "Among the collection of fossils from California belonging to the cabinet of Wabash College, Indiana (collected by Dr. Lorenzo G. Yates), there is a well-preserved series of lower molar teeth, represented in Figs. 1, 2, Plate XXXVII. These, from their size and constitution, would appear to belong to a species of llama exceeding in size not only the existing llama, but also the camel and the Palauchenia."

He further describes the teeth, and names the animal Auchenia hesterna. I quote some of his measurements of the teeth, in comparison with those of the camel and llama, as follows:

	Auchenia hesterna	Auchenia llama	Camel
Fourth premolar	lines	lines.	lines.
Antero-posterior diameter	13	5½	12
Transverse diameter	6	3	7
Length of crown	20	3½	4
First molar:			
Ant. post. diam. triturating surface	20	7	18
Trans. diam. triturating surface	10½	5	9
Length of crown	20	5	5
Second molar:			
An. pos. diam of trit. surface	26	9	23
Trans. diam. of trit. surface	8¾	5¾	10
Length of crown	36	6	10
Third molar:			
Ant. post. diam. where greatest	31	13	28
Trans. diam. where greatest	10	5½	10
Length of crown	41	7	17



Fossil Teeth and Bones of Elephas Americanus.
Santa Rosa Island, California.



PREHISTORIC FAUNA OF CALIFORNIA.

Explanation of Plate 12.

(From "Contributions to the Extinct Vertebrate Fauna of the Western Territories," by Professor Joseph Leidy; loc. cit.)

Figs. 1-3. **Auchenia hesterna**, Leidy.
Specimens from the quaternary of California, and belonging to the cabinet of Wabash College, Crawfordsville, Indiana; specimens discovered by Dr. Lorenzo G. Yates.

Fig. 1. Outer view of the series of lower molar teeth of the left side, one-half the natural size.

Fig. 2. Triturating surface of the same series, natural size.

Fig. 3. A second upper molar of the left side, view of the triturating surface.

"The length of the series of lower molars and premolars together, in the different species, is as follows:

Length of the series in the llama....................32 lines
Length of the series in the camel....................66 lines
Length of the series in the Auchenia hesterna........84 lines

"Accompanying the inferior molar specimens from California there is a specimen of an upper molar xxxx which from its constitution and size, is supposed to belong to the same species, if not the same individual."

More space has been given to these fossils described by Dr. Leidy than might be considered necessary, were it not that, I have been informed that they were all destroyed by the burning of the College Museum where they were installed, so that we have only the illustrations left. The writer secured a joint of the vertebra, a metacarpal and some other bones of the Auchenia, in an excellent state of preservation; also two portions of lower jaws with teeth, a cervical vertebra and other bones of the Auchenia, in the same county (Alameda). These were in a poor state of preservation, but they are packed away among the writer's collections, and at present not accessible for illustration. The joint of the vertebra found with the teeth described, is over eight inches in length, more than twice the length of the corresponding bone of a horse.

Dr. Leidy mentions another species of Auchenia found in California (A. californica,) and one from Mexico which Professor Owen called Palauchenia magna, which approximated in size the camel, whereas the Californian Auchenias much exceeded it.

MEGALOMERYX NIOBRARENSIS, Leidy.

Fossil teeth of another large animal of the camel family, named as above, have been found beneath the lava, in Tuolumne County, Cal., in the Pliocene.

RHINOCEROS.

Bones of Rhinoceros (Aphelops) hesperius, Leidy, were found under the lava in Calaveras County, at Douglas Flat, and Chili Gulch.

A single molar tooth of Rhinoceros oregonensis ? a species reputed to have pertained to the Pliocene deposits of Oregon,

was found by the writer in Pliocene ? deposit of Sonoma County.

HIPPOPOTAMUS

A fossil tooth of a hippopotamus, or closely allied animal, was found with the last named rhinoceros. Both specimens are in the Yates Collection.

BEAR

The late Professor E. D. Cope found remains of an extinct bear in a cave in the limestone of Shasta County, California; It was as large as the grizzly; he named it Arctotherium simum. Its teeth differed from those of living species.

PORPOISE.

Fossil remains of the porpoise (Delphinus), similar to the living species, have been found by the writer and others, at various points near the coast, from Santa Barbara to Half-Moon Bay, San Mateo County, in Pliocene and Quaternary formations.

CONCERNING FLEAS.

BY PROF. J. J. RIVERS.

Fleas, like all other true insects, pass through stages of development. Starting with the egg, which yields a larva, or grub, this continues toward maturity and when fully fed spins a cocoon, as does a silkworm, and assumes the chrysalis state. After a period of rest and ripening the tenant of the cocoon gives up the dormant period of its life and becomes a lively example of its class—a flea.

To entomologists a large number of different species are known, but the common tormentor is not the human flea, **Pulex irritans,** L., but the flea of the dog and cat, **Pulex serraticeps,** Gerv.

There are curious opinions as to the causes that produce fleas. Some persons aver that they breed in the sand by the sea shore, as they have often seen them in great numbers in such situations; other persons contend they are sure the prox-

imity to the beach has to do with their great propagation because the flea is a common pest at all seaside resorts and they can be seen down to the tidal margin. These persons lack technical observation; the real flea is in evidence without doubt at the resorts, but not down in the salt sea sand. The little hoppers called fleas are a crustacean and commonly go by the name of sand fleas. It is a small species of shrimp.

There is no actual necessity of being worried by fleas, but to gain immunity persons must be less careless of their household surroundings and more careful in their selection of their pets.

The propagation of fleas is a very interesting study and can be attained without mental stress. The only apparatus required is a clear white glass bottle of any capacity, then examine the mat, cloth, carpet, or the place where your dog makes his general quarters. Look closely and you will discover some very small globular objects beautifully shining and looking like pearls. These are the eggs of the flea. Place them in the bottle with some shreds of paper or cloth on which a few drops of blood have been placed. If, however, you have no dog, but have a cat, collect the sweepings of the room, particularly from the corners or from the seams of the flooring and place this refuse in a bottle as before mentioned, but without supplying any blood, and if the eggs are present fleas will be the product just the same as by the before-mentioned method.

The eggs you thus find will hatch out, if newly laid, in two days. The resultant larvae after a few moults spin a cocoon in which it remains eight days, emerging ultimately as a full grown flea in about sixteen to eighteen days after the egg was deposited.

A recent article in the "Times," of Los Angeles, gave some very erroneous ideas on the habits of fleas and the limits of their distribution. The reason of their prevalence on the sea coast is the moisture. Moisture (not too much) is essential to the breeding of the flea. Without a certain amount they are unable to complete their larval existence. Too dry air is fatal to the flea, so that no fleas are to be found above 4000 feet altitude in any part of Southern California. Neither is it to be found in our dry interior valleys whether elevated or not.

The country members of our Academy might supply us with sufficient information to enable us to issue a map of the distribution of this pest in our district.

At the seaside resorts the slops and sweepings are thrown around in a very promiscuous manner and when to this is added a small zoological establishment of dogs, cats, birds, rats and mice, it is not surprising there are occasionally epidemics of fleas.

Ocean Park, Cal.

"THE KISSING BUG."

BY DR. A. DAVIDSON.

It is with some temerity that one approaches the subject of the so called "kissing bug" nowadays. A few years ago the sensational daily papers, the comic, and even the scientific journals poked so much fun at the insect in question that it has this season been almost completely ignored. From the year 1899 to 1901 it was frequently commented on. Our most representative journal, the "Entomological News," in its editorial of September, 1899, says: "During the past summer the newspapers of the Atlantic coast have been exploiting numerous instances of individuals being attacked or "kissed" by an insect which in consequence of its asserted habit of swelling the lips of its human victim by its bite or sting, received the fatuous name of the "kissing bug." Originating in the neighborhood of Washington, D. C., the report spread from newspaper to newspaper and with the lay people became a veritable summer madness. The United States Department of Agriculture identified the insect as **Melanolestes picipes**, a hemipter of previously good character, which fact went a great way in making entomologists in general sceptical as to the whole story, and we are glad to record that the much maligned **Melanolestes** has proven an alibi, as far as the evidence presented at the Academy of Sciences of Philadelphia goes."

In this article there are given the names of about twenty insects that had at various times been brought to the Academy as the genuine "kissing bug."

The evidence above quoted is sufficient to discourage the

introduction into print of this subject. All popular beliefs, or prejudices if you will, have more or less of fact as a foundation and a bug that might with propriety be known as the "kissing bug" is, as anyone knows who lives in Arizona or Texas, an insect that unfortunately is too well known.

I spent three years in Eastern Arizona on the San Francisco river 3500 feet altitude. The surrounding country is mountainous in its general character but in no wise differs in its fauna and flora from most other parts of Arizona. The excessive warmth of summer compels the inhabitants to open all doors and windows at night or sleep in the open. In consequence they frequently suffer from injuries inflicted by scorpions, centipedes and "kissing bugs." The latter are either fairly common or very active, as scarcely a week passed in the summer time in which I have not seen one or more persons suffering from their bite. Though I carefully inquired the nature of this "kissing bug" I failed to find any one who ever had caught one in the act, and I myself had no idea of the exact cause. Dr. Frick, of Metcalf, whom I had enlisted in the search proved more fortunate, and last season he had two specimens brought him at different times that had been caught in the very act. These were examined by Mr. Coquillet, to whom they were sent, and pronounced to be **Conorhinus sanguisuga Lec.**, commonly known as the "blood-sucking cone-nose" or "the Texas bed-bug." The injury inflicted is almost invariably confined to the lips, generally the lower and at the junction of the mucous membrane with the skin. The pain is frequently sharp enough to awaken the sleeper and in one case reported by Dr. Frick it was followed by slight shock and nausea. The part bitten rapidly swells and assumes a dark tint. The swelling may vary from the size of an almond to a walnut and is well circumscribed in outline. Without treatment the swelling usually subsides in a few days. In only one instance have I heard of a bite inflicted on any other part of the body and that is probably due in part to the insect confining its attack to the parts of the body exposed while sleeping, or the failure of the bite to cause much swelling when received on parts of the body where the skin tissues are less lax than those of the lips.

The circumscribed nature of the swelling is characteristic of all lip injuries by the "kissing bug" and differs considerably from the diffused edematous swelling that follows stings by bees and wasps. The similarity of the swelling in all cases I have seen is proof to my mind that the insect injects some poison into the wound and does not merely infect it by an accidentally introduced poison. Mr. Marlatt (Bulletin No. 4, Division of Entomology U. S. Dept. Agriculture) in speaking of this household pest has related a few instances where symptoms of general poisoning had followed a bite of this insect and he presumes that in these cases the individual was poisoned by some irritant accidentally introduced, as it is not improbable that these blood-loving insects occasionally feed on carrion.

Last month a gentleman brought me in a specimen of Conorhinus from Victor on the Mohave desert where he said the insect this season had appeared in considerable numbers and had proved quite troublesome. This proved to be **Conorhinus protractus** Uhler, a species described from lower California, which also occurs in the Dragoon Mountains, Arizona, and at San Diego. There is a general impression that this insect is more common than it used to be, and as the climate is quite favorable to its increase in Southern California it may possibly be extending its range.

Los Angeles.

PUBLICATIONS RECEIVED.

"Missouri Botanical Garden." Fourteenth Report. 1903.

"Spodumene from San Diego Co., Cal.," by W. T. Schaller. Bull. Dept. Geology. Vol. 3, No. 13, University of California Publications.

"The Culture of the Central American Rubber Tree." Bureau of Plant Industry, Bulletin No. 49, U. S. Dept. Agriculture.

"The Description of Wheat Varieties." Bureau of Plant Industry, Bulletin No. 47.

"Experiment Station Records," Vol. 14, No. 12, and Vol. 15, No. 1, U. S. Department of Agriculture.

"The Cold Curing of Cheese." Bureau of Animal Industry. Bulletin No. 49, U. S. Department of Agriculture.

"Proceedings of the American Association for the Advancement of Science." Fifty second meeting, January, 1903.

ETHNOLOGICAL AND ARCHAEOLOGICAL SURVEY OF CALIFORNIA.

For several years the University of California, through its Department of Anthropology and by the liberal assistance of Mrs. Phoebe A. Hearst, has been engaged in an ethnological and archaeological survey of the State. A large amount of material, illustrative of Indian life and culture in past and present times, has been obtained and will form an important part of the anthropological collections which will in the future be exhibited in a museum of the University at Berkeley. At the present time this collection, with others of the department, is temporarily placed in one of the buildings of the Affiliated Colleges belonging to the University in San Francisco. Here the large and valuable collections are safely cared for until the permanent museum building is secured.

Systematic explorations are being made of the later gravel deposits, of several caves, and of the ancient shellheaps, in order to ascertain when man first occupied this region. The languages of the existing Indians are being studied by experts of the department; the customs and mythology of the different tribes are being carefully recorded; and collections illustrating their arts are being formed for the museum. A study of the physical characters of the various groups of Indians, combined with that of the skeletons found during the archaeological explorations, is being made in order to determine the physical relations of the Indians of California with those of other regions. By correlating the physical characters, the particular cultures of the past and present Indians, and the various linguistic stocks or families still extant, it is hoped to solve the great problem of the relationship of the numerous groups of Indians in California, and their relationship with peoples of other parts of the continent and possibly with certain tribes of Asia.

Nowhere in America has there been such a diversity of Indian languages as in California, a condition which has long puzzled anthropologists. During the past five years more investigations of these languages have been made by the University and by eastern institutions than in all previous time. These Indian languages are now fast disappearing. Several are at the present moment known only by five or six and others by twenty or thirty individuals, and hardly a year passes without some special dialect, or even language, becoming extinct. For this reason it is desired that students should be instructed in the methods of recording and studying Indian languages, and then devote themselves to special research. The University is, therefore, giving instruction in this branch of linguistics with the hope of preparing students to carry on the research before the opportunities pass away. Similar reasons apply to researches in other divisions of ethnology, and in archaeology; hence the training of students in these subjects is also undertaken by the Department of Anthropology.

The officers of the department make a special appeal to persons in

all parts of the State and adjacent regions for aid in this survey. Hundreds of Indian objects are found annually, which if carefully labeled as to where and how found and sent to the University, would, when brought together for comparative study, aid in the settlement of many important questions. The distribution of a particular kind of stone implement or of an ancient form of basket, and of many other objects of Indian manufacture (even the peculiar stone of which an implement is made is of great importance), will aid in determining the distribution of a tribe or group of which other records may be lost or so uncertain that just such confirmatory evidence to establish a particular point is required.

Information relating to the location of caves, shellheaps, old burial places, ancient village sites, and scattered fragments or survivors of nearly extinct tribes, is earnestly solicited, that such may be investigated by the department and may be correctly recorded on its ethnological and archaeological maps of the State.

The University is by this survey carrying on a research of great importance in obtaining a knowledge of the first peopling of the Pacific Coast and of the early migrations, and of the relationships of the recent and present Indians, a research that is required by anthropologists and by all interested in the early history of man. This work has been well begun, but assistance of many kinds is needed for its rapid progress. This assistance, it is hoped, will be given to aid the University of the State in an undertaking of such general interest.

Two volumes of the publications of the department, relating to the languages, myths and customs of certain tribes of California, are now in press and are to be followed by others as the material is prepared.

Correspondence leading to aid in this survey is solicited by the Department of Anthropology of the University of California.

BENJ. IDE WHEELER,
President of the University.

F. W. PUTNAM,
Director of the Department of Anthropology.

Berkeley, California, October 15, 1903.

Transactions for December, 1903

ACADEMY OF SCIENCES.

Los Angeles, California, November 2, 1903.

The regular monthly meeting of the Southern California Academy of Sciences was held this evening at 940 South Figueroa Street.

President Cumnock occupied the chair.

No business was transacted.

The evening was occupied with a lecture by Professor Wm. M. Frisbie on ''Oxygen,'' illustrated with numerous experiments. A large audience was in attendance, who thoroughly appreciated Professor Frisbie's lecture.

Adjourned.

B. R. BAUMGARDT, Secretary.

BIOLOGICAL SECTION.

Woman's Club House, November 9th, 1903.

The meeting was called to order by the chairman of the section. The minutes of the last meeting meeting were read and approved.

Two papers were read by title: ''Concerning Fleas,'' by Prof. J. J. Rivers; ''The So-Called Kissing Bug,'' by Dr. A. Davidson.

The lecture of the evening was deliverd by Prof. Jospeh Grinnell, on, ''The Midwinter Birds of Los Angeles.'' Among other interesting facts the lecturer stated that careful observation had convinced him that there are about two Audubon Warblers to the acre in this part of California during the winter. This means that this species of bird alone numbers some 12,800 in Pasadena, and as each one eats about twelve hundred flies each day, they destroy daily about three and a half millions of insects.

The Cedar Wax-Wing has the habit of eating the berries of the pepper tree and retaining them until the sweet layer of the berries is dissolved. When this has occurred, the bird regurgitates the remainder of the berries.

The lecture of the evening was intensely interesting, and suggested a great number of questions, many of which the lecturer answered.

About seventy members and visitors were present.

The meeting adjourned to meet again on the second Monday evening in December, at which time Dr. Gamber will lecture on Malaria.

C. A. WHITING, Secretary.

GEOLOGICAL SECTION.

Los Angeles, Cal., Nov. 23, 1903.

The Geological Section met at the Woman's Club Rooms at 8 p. m. Geo. W. Parsons in the chair.

Prof. E. H. Fosdick, City Chemist, was introduced as the lecturer of the evening. His subject was ''The Manufacture of Explosives.''

He exhibited samples, giving a scientific dissertation on the manufacture of each, and gave their chemical components.

The lecture was very interesting and was well attended.

G. MAJOR TABER, Secretary.

NEWS AND NOTES.

Mr. H. G. Watkins, of Hemet, reports as follows:

I had the good fortune to see, though imperfectly, on the morning of the 13th or 14th inst. A very brilliant meteor crossed from near the zenith northwest to a point not far from the horizon, describing a wavy, irregular course and exhibiting quite a large "head" at upper end of the trail left behind. The light emitted was greenish in color and very bright, lasting four or five seconds, but the meteor giving out no sound in its passage, either at the time or afterward. The passage occurred about 4 o'clock a. m., the trail showing for fully ten minutes afterward.

From Messrs. J. U. and C. G. Lloyd of Cincinnati we have received an elegantly printed copy of "Materia Medica Americana Potissimum Regni Vegetabilis," No. 3, of their Reproduction series. Attached to the copy is a reminder that they are still desirous of adding to their collection of puff-balls and they wish that all interested botanists would gather what they can and transmit to them.

The editor of "The Plant World" makes the interesting statement that "specimens cut from a single tree have been passed upon by experts in the genus to which this tree belongs, who have been able thus far, to name sixteen species, all growing from the same root." This remarkable revelation is significant of the value of much recent species-making. Of such are the greater part, in all probability, of the copious flood of "new species" discharged by some prolific authors, whatever familiar genus they may take in hand. The time is ripe for botanists capable of generalizing, of distinguishing between individual peculiarities and generic distinctions. It will be their work to select from the indigested masses now being heaped up, whatever may be of real value, casting the greater part into the oblivion of synonymy.—S. B. F.

Through the kindness of the author, Mr. Ralph Arnold, we have received a copy of "The Paleontolgy and Stratigraphy of the Marine Pliocene and Pleistocene of San Pedro, California." This is issued as one of the Contributions to Biology from the Hopkins Seaside Laboratory of the Leland Stanford University, and is the most important work relating to the biology of Southern California that has been published in recent years. To the student of conchology this will be a work of valuable reference, and a decided stimulus to further research. The work contains, besides a full list of the known fossil shells, numerous illustrations of the new species described, with photographs of Deadman's Island and the other rock sections that best illustrate the nature of the geological formations.

Bulletin
of the
Southern California Academy of Sciences

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VOL. III. JANUARY, 1904 NO. 1

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION
A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER G. W. PARSONS

CONTENTS:

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BULLETIN

OF THE

Southern California Academy of Sciences

VOL. 3. LOS ANGELES, CAL., JAN. 1, 1904. NO. 1

Quercus Wislizeni in Southern California.

BY LEROY ABRAMS.

In a former article in this publication (I:89, 1902) I had occasion to mention the occurrence of **Quercus Wislizeni** A. DC. in Southern California. Since then Mr. Parish in a later number of this publication (II:11, 1903) doubts the determination of my specimens, at least as far as the plants from San Bernardino Mountains are concerned. He says: "I have been unable to detect it in the San Bernardino Mountains, and specimens from that station with which Mr. Abrams has obliged me, while indecisive, appear rather to belong to **Q. dumosa**, the common scrub oak of the region." That this species should be confused with **Q. dumosa** can hardly be understood for they have nothing in common save that both, in our region, are shrubby. This confusion seems to exist, however, and for that reason it may be proper to point out some of the differences. The leaves of **Q. dumosa**, as it is now understood, are variable, but they are usually blunt and more or less short pubescent and grayish beneath, while those of **Q. Wislizeni** are usually pointed, a bright, glossy green and smooth on both surfaces. These characters make them easily distinguished in the sterile condition. In the fruit the characters are still more pronounced. **Q. dumosa**, being a white oak, has usually blunt acorns and more or less tuberculate cups, caused by the thickened scales. **Q. Wislizeni**, on the other hand, is a black oak and has pointed acorns and deep cups composed of thin scales, much resembling those of the well-known **Q. agrifolia**, to which species it is much more nearly related. This can be distinguished from both **Q. dumosa**

and **Q. agrifolia**, however, in that it develops the fruit the second year while they mature theirs the first. Some do not seem able to detect this fact unless they find the fruit and undeveloped ovules on the same twig, a circumstance seldom met with, for only the most vigorous twigs develop fruit two years in succession, but when it is known that the flowers appear on the young shoots in the spring, it goes without saying that, when the fruit develops the first year, it will be found on the twigs of the same season's growth, while those that develop the second year will be found on last year's twigs. Knowing this, it can, in nearly every case, be easily learned which year the fruit develops.

Upon the re-examination of my material I became convinced that my determinations alluded to above were correct and that these plants agree well with those from the more northern part of the state, and in addition to my former material, I have had the advantage of another season's collecting and am enabled to extend the range still further. Besides this material I have had the privilege of examining that in the following herbaria: Brandegee, Parish, California Academy of Sciences and Stanford University, in all of which I found more or less from our range. I give below a list of the specimens I examined, which were collected below the Tehachapi, including the collector and the herbarium in which the specimens are to be found:

Cuddy's Ranch, near Gormans Station. **Dudley**, No. 4366. (S. U.)

Kings Canyon, Sierra Liebre Mts. **Dudley**, No. 4346. (S. U.)

Mt. Lowe, **Dudley**, July 20, 1899. (S. U.)

Mt. Wilson. **Abrams**, No. 1518. (Abrams, S. U.)

Lytle Creek Canyon. **Hall**, No. 901. (S. U.)

Santa Inez Mountains. **Franceschi**, 1894. (Brandegee.)

Mt. Lowe. **Kinney**, September, 1902. (Parish.)

Arrowhead Grade, San Bernardino Mountains. **Shaw**, August, 1900. (Parish, Abrams.)

Santa Ana Canyon, San Bernardino Mountains. **Shaw**, August, 1900. (Abrams.)

Spencer Valley, San Diego County. **Abrams**, No. 3875. (Abrams, S. U.)

Cuyamaca Mountain. **Abrams**, No. 3950. (Abrams, S. U.)

Walker's Ranch, near Jacumba. **Abrams** No. 3697. (Abrams, S. U.)

San Pedro Martir, Lower California. **Brandegee**. (Cal. Academy.)

Stanford University.

The Bees of Southern California.—I.

BY T. D. A. COCKERELL.

The series of articles to appear under the above title will contain descriptions and records of Southern California bees, and it is hoped eventually to publish tables for the identification of all the species.

Stelis laticincta, Cresson.

Wilson's Peak, one male, collected by Dr. Davidson.

Only the female has been described. The male is similar, but only 6 mm. long, with the clypeus, a small supraclypeal mark, and a line beneath anterior ocellus, all yellow, in addition to the markings present in the female. The yellow stripes behind the eyes are continuous right across the top of the head. The anterior and hind tibiae are yellow on the outer side.

While working up the present insect I have become satisfied that the New Mexico insect which has passed for years as **S. costalis**, is quite distinct. It is to be said that Mr. Fox long ago compared it with Cresson's types, and did not think it was **costalis**. It may be known as **S. rudbeckiarum**, n. sp., the type being my No. 1567, Santa Fe, July, at flowers of **Rudbeckia**. It is about 7 mm. long, varying to $5\frac{1}{2}$, and the male agrees with Cresson's description of female **costalis**, except in the following character: Tubercles and pleura wholly black tegulae ferruginous, with a yellowish spot anteriorly; legs black, the knees broadly and the tarsi red, the hind femora have a good deal of red, and the tibiae show a little reddish on the inner side; yellow band on third abdominal segment not indented. The clypeus is entirely black.

Dianthidium.

Four species of this genus have been collected in Southern California. In the following table they are separated and compared with several species found elsewhere.

Scutellum all black in both sexes; size large (Europe).. ....**septemdentatum** (Latr.)

Scutellum with at least some yellow or whitish; size smaller 1

1. Small, compact species, with the hind edge of the scutellum produced and sharp-edged, the yellow marks on scutellum in a straight line or almost so; posterior coxae without spines. (**Anthidiellum**, n. subg., type **strigatum**) 2

Not so; scutellum less produced, the yellow marks or band on scutellum not in a straight line.............. 5.

2. Band on second abdominal segment nearly as widely interrupted as that on first, i. e., reduced to lateral marks (Europe)....................**strigatum** (Panzer).
Band on first adbdominal segment reduced to lateral marks, but that on second at most very narrowly interrupted.................................... 3.

3. Hind tibia without black (New Mexico)....**gilense** (Ckll.)
Hind tibia with a good deal of black.................. 4.

4. End of male abdomen with four little teeth; band on second abdominal segment very broadly interrupted (Mojave Desert ....**ehrhorni** (Ckll.)
End of male abdomen without such teeth; band on second abdominal segment very narrowly interrupted (Southern California)...............**robertsoni** (Ckll.)

5. Yellow band on first abdominal segment broadly interrupted in the middle (New Mexico)....**perpictum** (Ckll.)
Band on first abdominal segment entire in the middle, interrupted, if at all, at the sides.................... 6.

6. Base of abdomen with a good deal of red (Georgia, Texas, New Mexico, etc...............**curvatum** (Smith.)
Base of abdomen without red........................ 7.

7. End of male abdomen strongly trilobed; male with no supraclypeal mark; markings of abdomen chrome yellow in both sexes (So. California)......**consimile** (Ashm.)
End of male abdomen truncate, faintly trilobed; male with a small supraclypeal mark.................. 8.

8. Markings of abdomen pale yellow, bands more incised laterally (New Mexico, Colorado).......**parvum** (Cress.)
Markings of abdomen bright yellow, bands less incised laterally (Southern California)........**davidsoni** (Ckll.)

Dianthidium robertsoni, n. sp.

Four specimens collected by Dr. Davidson, three from Rock Creek, one from Los Angeles. Named after Mr. Charles Robertson, who first pointed out the presence of pulvilli in the genus. Small and compact, 5½ to 7 mm. long, the larger being females; black, with chrome yellow markings, strongly punctured; apex and apical half of costa of wings broadly fuliginous, the whole of the marginal and nearly all of the submarginal cells dark; the only yellow marks on head in the female are the large cuneiform lateral face-marks, and the entire occipital band, but in the male the clypeus and two triangles occupying the corners of the supraclypeal area and touching or almost touching medially are light yellow; markings of thorax and abdomen as in **D. gilense**, except that the anterolateral

stripes on margin of mesothorax are not bent posteriorly, the anterolateral spots on scutellum are wanting, the abdominal bands on the third and following segments are somewhat more widely interrupted, and are laterally very deeply incised or divided altogether, those on four and five always being divided; the sixth segment has much black, being in the female black with two yellow marks, and in the male usually yellow with a reversed black T; ventral scopa white; legs in female black, the apices of femora, tibiae and tarsi ferruginous; anterior tibae with more than the basal half yellow outside, middle tibiae all yellow outside, hind tibiae with a yellow basal spot; in the male the anterior and middle legs are strongly bearded with long white hair, the anterior tibiae are yellow outwardly and pale reddish within, the middle tibiae are yellow with a very large black spot on the outer surface and a similar reddish one on the inner, and the hind tibiae are black with the ends broadly yellow, the tarsi have the basal joint yellow and the small joints ferruginous; the apex of the male abdomen is truncate with a faint trilobation.

Dianthidium consimile (Ashmead.)

Dr. Davidson sends me three collected at Los Angeles; they bear dates June 13 and 15. I have identified the species from Ashmead's description, but I find that this, although stated to be that of a female, accords with the male of the insect before me. In the female the clypeus is black in the middle and yellow only at the sides. Except for this discrepancy the description applies excellently. The yellow tooth or spine on the hind coxae is very small in the female, somewhat larger in the male.

Dianthidium davidsoni, n. sp.

Two males collected by Dr. Davidson at Bear Valley, California.

Length 8 to 9 mm.; black with bright chrome yellow markings. In structure and markings similar to **D. parvum,** but larger, with the yellow much brighter, and the abdominal bands much less incised. The pubescence of the upper part of the head and thorax has a yellowish tint. Apical segment of abdomen yellow, truncate and faintly trilobed, only its extreme base, where it is overlapped by the penultimate segment, is black: penultimate segment yellow except the overlapped base, a median basal pointed process, and two transverse subapical marks (in **parvum** it is black with two light yellow crescents joining medially); first recurrent nervure about as far from base of second submarginal cell as the second is beyond its apex: yellow spines of hind coxae very large; pleura with or without a small yellow spot.

The following species, hitherto placed in **Anthidium,** must be transferred to **Dianthidium, D. formosum** (Cress.), **D. gabbi**

(Cress.), **D. mexicanum** (Cress.), **D. apicale** (Cress.), **D. bivittatum** (Cress.), **D. toltecum** (Cress.), **D. agnatum** (Cress.), **D. texanum** (Cress.), **D. ulkei** (Cress.), **D. cressonii** (Dalla Terre, **D. lepidum** (Cress.), **D. simile,** (Cress.), **D. concinnum** (Cress.), **D. pudens** (Cress). The easiest way to distinguish **Dianthidium** from **Anthidium** is to notice the little pulvillus or pad between the claws, this being absent in the latter genus. **Stelis** looks like **Dianthidium,** but it is a parasitic bee, and consequently the female has no scopa for holding pollen.

The species of **Dianthidium** are "resiniers," making resin nests; **Anthidium** lines its nest with cottony fibers.

Prehistoric California.

(Continued from December BULLETIN.)

BY DR. LORENZO GORDIN YATES.

WHALE.

Fossil remains of whales have been found at many localities, mostly near the coast. One of these found in the Plicoene ? near Santa Barbara by Professor George Davidson was named by Professor Cope, who called it **Eschrichtius Davidsoni.** It was as large as the "California Gray Whale," but belonged to the "Finbacks."

THE HOG.

Elotherium imperator, Leidy, from the Miocene at Douglas Flat, Calaveras county, under the lava, is described as allied to the hog.

SLOTH.

Professor Cope named an animal found in Quaternary of the Klamath River, at Yreka, the **Moritherium giganteum.** It was an extinct Sloth, and is supposed to have made the tracks resemblinggigantic footprints found in the Carson Quarry in Nevada.

Professor Cope named an animal found in the Quaternary of the Klamath River, at Yreka, the Moritherium giganteum. It was an extinct Sloth, and is supposed to have made the tracks resembling gigantic human footprints found in the Carson Quarry in Nevada.

TAPIR.

The South American Tapir is represented by fossils found in the Auriferous Gravel, above the lava, in Tuolumne county.

BEAVER.

A fossil rodent, **Sigmogomphius Le Contei,** Merriam, named for the late Professor Joseph Le Conte, was found by Professor

MAMMOTH (**Elephas primigenius**)

Reproduction of a painting by C. R. Knight for McClure's Magazine

Courtesy The U. S. National Museum

John C. Merriam of the University of California in the lower deposits of the Pliocene, near Berkeley, in fresh water beds.*

The writer found skulls of the Beaver (Castor fiber ?) in the marshy banks of the San Joaquin River above Antioch. These have not been subjected to critical examination.

NON-MAMMALIAN VERTEBRATES.

Sharks.

Numerous species of fossil sharks have been found in California, notably in Kern county, where ten of the species described by Agassiz have been recognized.

(Numerous specimens of the teeth and bones of vertebrates found in the Quaternary by the writer have not, as yet, been determined.)

In Volume XXIV. of the "Proceedings of the United States National Museum, Washington, 1902," Dr. Frederic A. Lucas has described "A Flightless Auk, **Mancalla Californiensis**, from the Miocene of California."

The genus was founded upon "a nearly complete left humerus found in excavating Third street tunnel at Los Angeles, California, in strata considered by Mr. W. H. Dall as belonging to the Upper Miocene or Lower Pliocene, probably the former."

It is probable, as Professor Whitney and Dr. Cooper suggested, that the fragmentary bones and teeth of many of the extinct mammals which have been found in the Quaternary of California are portions of animals inhabiting California during the Miocene and Pliocene periods, and that during some of the great changes resulting from the erosion and detrition caused by the local elevations and depressions of the surface they were weathered out and transported to distant localities by the rush of waters over their original place of deposit, and were again buried in the debris of later epochs.

All of the fossil remains of the before mentioned animals, which the writer has found in undoubted Quaternary deposits, indicate that the bones had been thus distributed.

Some of those found in the Pliocene may have been originally deposited in Miocene formations. In one instance the writer found in the bed of Alameda Creek, near Niles, Alameda County, a boulder of very hard, coarse conglomerate in which was imbedded a perfect molar tooth of a mastodon. The boulder was undoubtedly a portion of a Pliocene deposit, some miles distant, and had been rounded off by the combined action of water and the friction of other rocks during its rough journey in the rocky bed of the present creek, and had it not been for

* Bulletin of the Department of Geology, University of California, Vol. I, No. 13, 1896.

the material in which it was imbedded being easily recognizable, it would have been referred to the Quaternary. We will go still further back in its history. The tooth was nearly perfect and had been but little worn, showing that it had not been shed during the lifetime of the animal, and not being connected with any other portion of the skeleton, it may have belonged to an animal of the Miocene Period, whose remains were imbedded in the deposits of that period, and had been exposed and subsequently separated from the other portions of the skeletion by the action of the elements and again deposited in one of the "Dead Rivers" of the Pliocene Period, to be again disentombed and removed after the lapse of many thousands of years.

Had this tooth been covered up and left where the writer found it (in close proximity to an Indian Rancheria), it might after other thousands of years, have been discovered by some future scientist and been considered satisfactory proof of the contemporaneity of man and the Mastodon.

Such instances show the necessity of close study, careful discrimination and conservative deductions in an attempt to read detailed history from the Book of Nature.

THE LENGTH OF GEOLOGIC TIME.

For the benefit of those who have not given much thought to the subject of the Earth's age the following estimates made by eminent geologists and physicists are given. Those of the geologists are based upon the present rate of deposit of marine sediment, and the destruction of land by erosion and denudation, compared with the total thickness of sedimentary rocks. The correctness of the estimates—provided that the rates have been always uniform—is evident, but in the absence of that assurance the conclusions are uncertain and elusive.

The estimates of the physicists are based upon the application of the laws of heat radiation, and their conclusions have materially modified the former theory, that for the deposition or formation of the sedimentary rocks a minimum of hundreds of millions of years were required, and for the time which elapsed since the earth was in a molten state no limit could be given.

Mr. Clarence King, a former United States Geologist, as the result of experiments upon the behavior of certain rocks under conditions of heat and pressure, came to the conclusion that it cannot be more than twenty-four million years since the earth was in a molten state or condition.

Mr. Warren Upham gives forty-eight million years as the age of the stratified rocks and one hundred million of years as the age of the ocean.

Sir Charles Lyell, the eminent English geologist, gave as his estimate of the age of the fossil bearing sedimentary rocks, two hundred and forty millions of years.

Sir Archibald Geikie's estimate was 100 million of years.

Professor J. D. Dana's estimate was 48 million of years.

Professor Joseph Le Conte's estimate was 30 million of years.

Mr. C. D. Walcott's estimate was 28 million of years for the total period of existence of fossil-bearing sediments.

And for the time which has elapsed since the earth was in a molten state the following eminent physicists drew these conclusions:

Sir William Thomson's estimate was 100 million years.

Professor George H. Darwin's estimate was 57 million years.

Professor Simon Newcomb's estimate was 14 million years.

Dr. Alexander Winchell's estimate was 3 million years.

As to the relative durations of the greater geological time divisions the conclusions of eminent scientists are more in accord.

For the Paleozoic (Ancient Life), which includes the Silurian, Devonian and Carboniferous Ages, seventeen million, five hundred thousand years.

The Mesozoic or Mediaeval (Age of Reptiles), seven million two hundred and forty thousand years; and for the Cenozoic or Recent, which is represented by the Tertiary and Post-Tertiary Periods, two million nine hundred thousand years.

"The time since the departure of the ice of the Glacial period from this portion of the continent has been estimated by several eminent authorities, from different data, and their figures fall within six thousand to ten thousand years." *

Prehistoric Man and his Development.

BY DR. LORENZO G. YATES, F. L. S.

Honorary Member Southern California Academy of Sciences,
President of the Santa Barbara Society of Natural History, Etc.

History is defined as a narrative of past events, oral or written, and is divided into Ancient, Mediaeval and Modern. Ancient History treats of the history of man from the earliest records to the destruction of the Roman Empire, A. D. 476; Mediaeval History is the history of the Middle Ages, from A. D. 476 to the beginning of the sixteenth century, and Modern History from the close of the Middle Ages to the present time.

As the above terms apply to the world at large and man in general the study of the history of man as considered in his re-

* Herman LeRoy Fairchild, in Proceedings of the Rochester Academy of Science, Vol. II.

lations to the groups and divisions of mankind required a different term for its definition, and the late Sir Daniel Wilson, a Scottish-Canadian archaeologist and former President of the Toronto University, coined the word Pre-Historic, using it in the title to his "Archaeology and Prehistoric Annals of Scotland," published in 1851.

This term includes the science of the races of men, their character, history, customs, institutions and language, as derived from sources other than oral or written evidence, and includes that part of Ethnology which relates to the unwritten history of the various races, nations and tribes derived from their relics.

Much has been written, and in all probability much more will be written on the subject of man's origin, and yet but little is known as to How, When or Where man first appeared on the earth.

The Book of Nature, which has thrown so much light on the origin, evolution and age of the lower orders of animals, gives comparatively little evidence which can be utilized for the better knowledge of a subject which is of such interest to the educated portion of humanity.

The "Cradle of the Human Race" has been discovered (?) by many scientists, and by them located in many and widely separated countries, but so far no incontrovertible evidence has been adduced which would give any preponderance of evidence, or even probability to any one of the given localities over the others as regarding the origin of mankind, and it seems more than probable that the locality or localities whence the race or races sprang has been entirely obliterated by changes in the earth's surface, and that the island, continent, or portion of dry land first inhabited by man now forms the bed of one or more of our great oceans.

The late Professor Joseph Leconte in his "A Century of Geology" claimed that "The fundamental idea underlying geological thought is theh istory of the earth.

"That until the beginning of the nineteenth century the earth was not supposed to have any history," it was supposed to have been made at once, out of hand, about six thousand years ago, and to have remained substantially unchanged ever since as the necessary theater of human history.

An effort to crowd all the changes which have taken place in the history of our earth into the period of time given by the Jewish writings as the age of the earth, would be like attempting to force all the water of the Pacific Ocean into a lake.

About the middle of the eighteenth century Buffon brought out dimly the idea of an abyss of time, preceding the advent of man, in which the earth was inhabited by plants and animals

wholly different from those of the present day, but the priests of Sorbourne compelled him to retract such irreligious views.

Hutton in the last part of the eighteenth century first clearly concieved the idea that the science of zoology alone is a view of Nature in continuous movement—a life history—an evolution of Nature, all other sciences, including astronomy, being but "flash-light views of Nature."

Lyell showed that "causes now in operation" are producing similar effects under our eyes, of changes which have been going on since the beginning of time.

In the early years of the eighteenth century William Smith laid the foundations of stratigraphy, and Cuvier, by his studies of the wonderful discoveries of extinct mammals in the Eocene Basin of Paris, opened up to the mind of the student in a clearer light the existence of other time worlds before the present one.

It is neither essential nor practicable in this short abstract to follow the various opposing theories as to how the changes in the sea, earth and its inhabitants were brought about, as claimed by Neptunists, Plutonists, Catastrophists and Uniformitarianists, as these opposing factions were eventually reconciled by scientific assimilation.

The Catastrophists held that the whole history of the earth consisted of a series of sudden, violent, supernatural catastrophies which exterminated all life on the globe. These were supposed to be followed by periods of quiet, during which the new earth was re-peopled by direct act of creation, with new forms of life adapted to the new conditions. Species were supposed to have been created at once, out of hand, without natural process. These spread in all directions, and remained unchanged until another universal catastrophe exterminated them.

The great apostles of this theory were Cuvier and Buckland.

Lyell advocated the theory of uniformity of changes in the inorganic world, but he admitted the supernatural catastrophic changes in organic nature. After the publication of Darwin's "Origin of Species," Lyell embraced the new theory, which reconciled the opposing theories, and became generally accepted.

PUBLICATIONS RECEIVED.

"The Codling Moth." Division of Entomology. Bulletin No. 41 U. S. Department Agriculture.

"Olive Oil and its Substitutes." Bureau of Chemistry. Bulletin No. 77, U. S. Department of Agriculture.

"Bee Products in Arizona." No. 48, Agricultural Experiment Station, University of Arizona.

Transactions for December, 1903.

ACADEMY OF SCIENCES.

Los Angeles, California, December 7, 1903.

The regular monthly meeting of the Academy of Sciences was held this evening at 940 South Figueroa Street.

President Comstock occupied the Chair.

The subject for the evening was a lecture on Sweden, by B. R. Baumgardt. The speaker illustrated the subject with 100 lantern views and dealt with the ethnology, history, art and literature of that country.

There being no further business, the meeting adjourned.

B. R. BAUMGARDT, Secretary.

ASTRONOMICAL SECTION.

An unusually interesting and instructive session of the Astronomical Section was held on December 21st, the occasion being a "Herbert Spencer Symposium."

The subject was appropriately introduced by Chairman W. H. Knight, who first presented Dr. Theodore Comstock, president of the Academy, whose theme was "Spencer's Early Papers, Precursors of Recent Scientific Conclusions."

The speaker gave a clear and concise exposition of Spencer's early works, showing the remarkable insight of the great philosopher into the intricacies of nearly all of the sciences, and touching upon the beautiful simplicity and humility of the life that had commanded the respect and reverence of the civilized world.

Rabbi S. Hecht then presented the topic of "Spencer as a Man." He went into the boyhood and early manhood of Spencer, emphasizing his independence of thought and action and his devotion to the logic of principles. He also dwelt upon the encyclopaedic knowledge of the great thinker, and his power to use the knowledge he possessed.

At this stage of the proceedings an unexpected pleasure was derived from the reading by Mrs. Calvert Wilson of a poem in praise of the virtues and achievements of Spencer, written by Mrs. Elizabeth Cheney.

"Spencer's Attitude Toward Metaphysics, and His Contributions to the Science of Astronomy," was the theme of Secretary B. R. Baumgardt's remarks, who, in his usually clear and forceful style, gave a synopsis of the philosopher's views on the more abstruse topics of thought and investigation, and gave him due credit for the substantial aid rendered by him to the sciences of astronomy and chemistry, notably in his attitude toward the nebular hypothesis and the theory of the nature and origin of the universe.

Mr. W. A. Spalding was then introduced, and spoke of "Spencer's Law of the Development of Society." He represented Spencer as "one who set aside Divine revelations except so far as they could be explained on scientific principles," and as "having broken away from the thraldom of religious dogma."

Hon. W. A. Cheney was the last speaker of the evening, and his topic was "Spencer on the Phenomena of the Mind."

Judge Cheney gave high praise to Spencer's system of philosophy, calling it "the philosophic yard-stick of all time to come."

He claimed that Spencer taught the evolution of the human mind and the human soul, as well as of the human body, and that no name of the last century could be compared with his for greatness of conception and magnificence of execution.

In criticism of the English authorities in denying to him burial in Westminster Abbey because of his supposed atheistic sentiments, he said

that Spencer was too great for Westminster, and the only appropriate place for his interment was in the world of thought.

The meeting was largely attended and much enthusiastic interest was manifested.

MELVILLE DOZIER, Secretary.

BIOLOGICAL SECTION.

Woman's Club House, Dec. 19th, 1903.

The meeting was called to order by the Chairman of the Section.

The minutes of the last meeting were read and approved.

The lecture of the evening was delivered by Dr. B. F. Gamber, on the subject of "Malaria." The lecture was illustrated by blackboard drawings and by a number of microscopical slides. The microscopes which were used were loaned by the University of Southern California and by the Pacific School of Osteopathy.

The paper was discussed by Mr. W. H. Knight, Dr. Bishop and a number of others.

About thirty-five members and visitors were present.

On motion the section adjourned to meet again on the second Monday evening in January, 1904.

C. A. WHITING, Secretary.

GEOLOGICAL SECTION.

Los Angeles, December 28th, 1903.

The Geological Section of the Academy of Sciences met at the Woman's Club Rooms on the 28th inst.

Wm. H. Knight acted as Chairman pro tem. President Theo. B. Comstock was introduced and gave a very interesting description of the Physical Geography and Geology of Brazil. The lecture was intensely interesting, and many questions were asked by the audience after the lecture was concluded.

G. MAJOR TABER, Secretary.

ARCHAEOLOGICAL INSTITUTE.

There has been organized in Los Angeles the Southwest Society of the Archaeological Institute of America, for the purpose of collecting, preserving and publishing the fast disappearing relics of man and his institutions in this prolific field, aided by the parent institute, of which Professor Francis W. Kelsey, of the University of Michigan, is the Secretary. The officers of this local branch are: President, J. S. Slauson; Vice-Presidents, F. M. Rindge, Dr. Norman Bridge, Colonel H. G. Otis, Rev. George F. Bovard; Recorder and Curator, Dr. F. M. Palmer; Treasurer, W. C. Patterson.

Executive Committee—Dr. Theo. B. Comstock, chairman; Rev. Geo. F. Bovard, Rev. C. J. K. Jones, Dr. F. M. Palmer, Chas. F. Lummis, Professor J. A. Foshay.

A lecture of thrilling interest was given on the evening of December 3rd by Prof. Kelsey, on "Recent Discoveries in Pompeii." Marked interest is shown by our citizens and the membership is rapidly growing. Steps have been taken to conduct researches on the Mexican and Indian folk-lore of this region, and the Executive Committee is now planning for a demonstration on this subject in January, which may come as a revelation to those who have not given the subject attention.

It is most agreeable to chronicle any event in the history of California, which, like this, tends in the general direction of the aims and purposes of the Academy of Sciences.

There should be a general Museum here to conserve and illustrate every phase of the subjects covered by the Academy of Science, the Historical Society and the Archaeological Institute.

Through the direct support guaranteed by connection with the national organization, there is hope of vitality and permanence in the new society, which we bid God speed in its work. The inaugural address of President Comstock, read before the Academy in 1902 and published in the June number for that year, of the Bulletin, contains suggestions for a very similar union of local Academies of Sciences with the American Association for the Advancement of Science, or the Carnegie Institution, or some other national rallying point.

We welcome any movement which tends to vivify and consolidate the energies of those whose labor of love in the cause of Science has been necessarily disconnected and often disheartening in the past.

NOTES AND NEWS.

From experiments conducted at the Montana Agriculture Experiment Station it was found that the evaporation and transpiration from the grain was about 16 per cent greater than the evaporation from the bare soil. For the period named, the former averages 1 1-7 inch and the latter 9-10 inch per week over the surface. For the same period the evaporation from a water surface was 13 to 16 inches per week. . . . The crop in every case not only evaporated all of the irrigation water, but robbed the soil of part of the moisture which it contained at seed time.

The changing of the sex in plants (Trop. Agr., 22 (1903), No. 11, pp. 789, 790).—The possibility of changing the sex of the date palm and of the papaw is discussed. About 80 per cent of seedlings of date palms are male. The method of the Arabs in some of the oases in the southern part of Algeria in changing these male plants into bearing trees is to tear off all the leaves from the foot stalks, at 2 or 3 years of age, so that the medial nerve is split in two from the center to the leaf sheaf. It is believed that this tearing process brings about a concentration of the sap movement in the same way as is the case in annular incisions, resulting in an accumulation of sap, "which is more necessary for the vital functions of the female plant than for those of the male." The writer states that it has been his experience that cutting off the terminal buds of papaw trees (Carica papaya) as soon as the character of the flower is apparent results in altering that character, inducing the tree to yield good fruit in place of the poor specimens borne by the so-called male trees.

Evaporation from a water surface, E. F. Ladd (North Dakota Sta. Rpt. 1902, pp. 20, 21).—Observations were made as follows: "A galvanized iron tank 3 ft. square by 14 in. in depth painted black contained a second smaller tank 12 by 12 by 12 in. in dimensions, likewise blackened. These were sunk in a grass plat level with the surface of the ground. The small tank contained distilled water and this tank within the larger was surrounded with water. Daily measurements were made of the amount of evaporation, and the results by months are given. . . . The total amount of water evaporated from a water surface for the five months, May to September, inclusive, was 28.12 in., or an average of 5.624 in, per month, or a daily average of 0.183 in. The total rainfall for the same period of time was . . . but little more than one-half as much as the water evaporation for the same period, or an average of 2.864 in. per month, or an average daily rainfall of 0.0936 in., as compared with an evaporation of 0.183 in. per day."

The New Zealand Parliament has passed a bill empowering the Governor to introduce after January, 1906, the metric system, which is then to become the system of weights and measures for the country.

The Seismological Commission of the British Association inferred from the data collected that the crust of the earth was not more than forty miles thick, the interior having a very high effective rigidity and the nucleus being probably more uniform in its chemical and physical conditions than was usually supposed.—(Science, Vol. XVIII, No. 464.)

"In Olive Oil and Its Substitutes," there may be found an interesting and accurate analysis of the oils imported into and produced in this country. The following is the summary of the author's investigations:

1. The olive oil consumed in this country is largely imported from France and Italy. The amount produced in California is relatively small, although reports warrant the statement that California is capable of supplying the entire home demand.
2. The cost of production of California oil is so much higher than that of the French and Italian oils that it competes with difficulty with the imported oils in the American market, even after the latter have paid duty amounting to 50 cents per gallon.
3. The retail prices of the best grade of oil from the three sources are much the same, but the average prices of the imported oils are much less than that of the California oil, owing to the large amount of lower grade foreign oils that are marketed in this country.
4. In the examination of olive oils for adulteration, a complete analysis is usually necessary to reveal the real nature of the oil. In cases of gross adulteration the qualitative tests, specific gravity, and index of refraction will often show the nature of the adulterant and the extent to which it is employed.
5. The adulteration of foreign oils imported into this country is practiced to a much less extent than is popularly supposed. Only 5 of the 61 samples obtained from the customs officers were found to contain other than olive oil, and none of these contained cotton-seed oil. On the other hand, oils bought upon the market, bearing labels indicating a foreign origin, were found to be quite extensively adulterated with cotton-seed oil. It seems, therefore, probable that these adulterated oils bearing foreign labels are labeled and modified after leaving the port of entry, neither the domestic nor the foreign producer being responsible for them. This practice is equally injurious to the interests of the California, French, or Italian manufacturer of pure olive oil and the consumer.
6. The results of analyses of oils of known purity show that there is a wide range in the various values ordinarily considered of importance in indicating the purity of an oil. This is especially true of the iodin number, the melting point of fatty acids, and the percentage of solid fatty acids. The California olive oils generally have a higher iodin number, a lower melting point of fatty acids, and a lower percentage of solid fatty acids than the French and Italian oils.
7. All samples containing other than olive oil were sold as pure olive oil, although in one case a careful observation of the label revealed the fact that the oil was an olive oil substitute.

The alfalfa butterfly (Colias eurytheme) has so increased in numbers since 1895 that the honey flow which used to continue well into September is now cut short in July. The adulteration of honey, in Arizona, is not commercially possible for the excellent reason that freight rates so enhance the price of glucose and sugar that these adulterants cannot be profitably used.—("Bee-products in Arizona." By R. H. Forbes.)

The local Historical Society have begun to agitate for State help in the establishment of a building to house their valuable historical books and relics. We have reached that point in civic evolution where a museum is almost an absolute necessity for educational purposes. Our Academy sections alone could in a few years stock a museum with all the representative objects native to the West.

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Some Contributions to the Phytogeography of Southern California.

There have recently appeared three papers on plant distribution, to which the attention of the botanists of Southern California should be called. They are the following:

Die pflanzengeographische Gliederung Nordamerikas. A. Engler. Notizblatt des K. K. Gart. u. Mus. zu Berlin, Appendix ix. 1-94. (May, 1902).

Notes on Plant Distribution in Southern California, U. S. A. R. E. B. McKenney. Beihefte zum Bot. Centralblatt. x. 166-178 (1901).

A Sketch of the Flora of Southern California. S. B. Parish. Botanical Gazette xxxvi. 203-222, 259-279 (September and October, 1903).

A paper of considerable importance to students of plant geography is the one in which Professor Engler outlines a scheme to serve as a basis for the arrangement of American plants in the royal gardens near Berlin. The American botanist will be most interested in the manner in which he has divided our continent into regions and minor divisions. Its first division is into four regions (gebiete), the Arctic, Subarctic, Atlantic, and Pacific. The Pacific region he subdivides into: (1) the province of Pacific Coniferae, (2) the Rocky Mountain province, and (3) the Western Prairie-, Desert- and Alkali-Steppe province. In the province of Pacific Coniferae he finds a Northern zone and a Southern zone, the latter comprising: (a) the district (bezirk) of the coast forests of California and (b) the forest district of

Western Nevada and the Sierra Nevada Mountains. The Western Desert-Steppe province includes: (a) the transition from the Chaparral and Sonora province of the Central American Xerophyte region to the Mohave and Gila deserts, (b) the Great Basin zone and (c) the Inner California zone.

A brief description of the flora of each of these regions is given and here the numerous errors in regard to the distribution of species are to be charged to the account of American botanists, who are often exceedingly lax in their methods of stating ranges, rather than to that of the author himself. In California there has been so little done in the matter of working out the exact ranges of particular species that we cannot be surprised if foreign botanists are unable to get an accurate idea of the different floral belts of the state. Exhibiting as it does the views of one of the foremost authorities on this subject, the outline given by Dr. Engler will probably serve as a basis for more elaborate treatises on the phytogeography of North America.

In the contribution submitted by Mr. McKenney we have a more detailed account of a very limited region. The author, who was at one time connected with the Santa Ana schools, confines himself to a discussion of the plant formations of Orange County, of which seven are distinguished; the Mountain, Foot-hill, Canyon, River Bed, Mesa, Bog and Strand formations. The principal species occurring in each of these formations are mentioned and the character of the vegetation described. As in other parts of Southern California, the principal factor affecting plant distribution in Orange County is found to be moisture, the conditions of light and heat being relatively unimportant, since they are quite uniform throughout the county. Except in the River Bed formation, soil moisture is of more importance than surface moisture and the amount of available soil moisture is dependant largely upon soil structure. The chemical nature of the soil is a dominant factor on the alkali mesas and along the strand. Among the five species of seaweeds given as belonging to the Strand formation algologists will be surprised to find three which have never before been reported from the Pacific coast! The figures accompanying the paper are too poor to be of any value and the sketch-map is even worse. The paper itself, however, gives one a very good idea of the flora of this interesting region and is a welcome addition to our meager literature.

But by far the most important contribution to the phytogeography of Southern California is a recent paper by Mr. S. B. Parish. Since this report represents the results of nearly thirty years of field work by a botanist who has the ability both to make careful observations and to draw trustworthy conclusions therefrom, it deserves more than a passing notice. After pre-

senting a descriptive account of the region and much necessary information and statistics concerning its climatic characteristics, the author enters into a discussion of the various phytogeographic areas into which it is naturally divided. He finds that the whole of Southern California may be divided into three primary areas. The first of these, termed the Nevadan area from the fact that its flora is in the main a continuation of that of the Sierra Nevada Mountains, extends in a Northwest and Southeast direction and includes all of the truly montane section, as well as all the forests of the territory. To the East and Northeast is a treeless waste, or desert area, while a Cismontane area of open plains and chaparral-covered hills occupies the territory between the Nevadan area and the Pacific ocean. Above the Nevadan area traces of an Arctic-Alpine zone are recognized on Grayback and San Jacinto mountains. The flora of this zone is likewise of northern origin and the reasons for its exclusion from the Nevadan area are not stated. Within the Nevadan area proper three life zones are distinguished: the Hudsonian, marked in general by Pinus flexilis; the Canadian, roughly indicated by Pinus Murrayana; and the Transition, best identified by the presence of Pinus ponderosa. The last of these zones is the most important and includes, besides the pine just mentioned and its variety Jeffreyi, such conifers as Abies Douglasii, Libocedrus decurrens and Pinus Lambertiana.

Just below this pine belt and above the belt of chaparral there occurs what the author terms an intermediate, or true Transitional zone. On the Desert side its most characteristic plants are Juniperus Californicus and Cercocarpus ledifolius, while within its limits such diverse species as Abies concolor and Yucca brevifolia are found growing side by side, as also are Pinus ponderosa and P. monophylla. On the cismontane flank this belt is marked by the presence of Pseudotsuga macrocarpa and Pinus Coulteri, the latter, however, extending well up into the Pinus ponderosa belt. While this intermediate belt is in most places quite narrow the author has done good service in pointing out its presence and characteristics. Although it is spoken of as a "true Transitional zone," it is not to be confused with the broader and much more important zone next above, which has been generally known as the Transition zone.

The Desert area is divided naturally into the Mohave subarea and the Colorado subarea. It is shown that the flora of the former has its extension to the north while that of the latter has its extension toward or into Mexico. The difference in the character of these two floras is found to be due only in part to climatic causes, but is largely influenced by the topography of the region. The Cismontane area exhibits three more or less distinct floras, each of which is indicative of its peculiar subarea.

These subareas are denoted as the Interior, Coastal and Insular. It is interesting to note that the names applied by Merriam to those life zones occupying all of Southern California except the mountains are used by Mr. Parish but once and then only in a chart. Even here they are applied to what are termed regions, the Lower Sonoran region corresponding to the Desert area, the Upper Sonoran to the Cismontane area. According to Dr. Merriam's latest published views most of the Cismontane area would fall within the Lower Sonoran zone. In our estimation it is quite as important to distinguish between the Desert and Cismontane areas as between the Lower and Upper Sonoran zones, although both of these distinctions are not without considerable value. The splitting up of the Desert area into Juniper, Pinyon, Yucca, Larrea and Atriplex "zones" and of the Cismontane area into similar zones and subareas, as proposed by Mr. Parish, will be very helpful to the field student. It will be noted that this use of the term **zone** is not exactly the same as that assigned to it by Merriam, while Engler has used it in a still different sense; and it will be further seen that none of these authors apply the term as did Schimper in his "Pflanzengeographie." If the confusion arising from the use of this much abused term can be avoided in no other way we should like to suggest that these minor divisions pointed out by Mr. Parish be termed **belts**. It seems to us quite proper to speak, for example, of a Juniper belt, a Pinon belt, or even of a Chaparral belt. However, the adjectives used by Mr. Parish in designating the different zones, or belts, are so self-explanatory that there is little danger of confusion, no matter to what noun they may be attached.

A very readable chapter is the one which treats of the adaptation of plants to climatic conditions and no less interesting is the author's discussion of the affinities of the flora. Many other important phases of the subject are carefully worked out and the paper closes with a brief sketch of the cryptogamic flora.

This contribution by one so thoroughly conversant with the distribution of plants in Southern California will serve as a basis for all future work in this territory and the students of our California flora have reason to feel grateful to Mr. Parish, not only for the great amount of field work he has accomplished, but also for the clear and interesting style in which he has presented the results of his observations.

H. M. HALL.

The Bees of Southern California. II.

BY T. D. A. COCKERELL.

When writing on **Dianthidium**, I failed to notice that **Anthidium singulare**, Cresson, and **A. larreae**, Ckll., both belong to this genus. The following table separates those species of **Anthidium** and **Dianthidium** in which the cheeks are partly or wholly yellow, and the yellow of the cheeks is connected by a line (sometimes slightly interrupted in the middle) across the top of the head.

Lateral margins of abdominal segments 2 to 4 produced into hollow processes, which look like spines directed backwards, when seen from above 1

Lateral margins of abdominal segments 2 to 4 normal....... 2

1. First two abdominal segments with the yellow bands divided into spots (Nevada)..**Dianthidium singulare** (Cresson)

First two abdominal segments with the yellow bands deeply notched, but not divided (Southern California).......... **D. singulare** var. **perluteum**, v. nov.

2. Pulvillus present; legs red (New Mexico).............. **Dianthidium larreae** (Ckll.)

Pulvillus absent; legs yellow and black.................... 3

3. Dorsal pubescence of thorax white (Southern California) **Anthidium serranum**, n. sp.

Dorsal pubescence of head and thorax pale fuscous.......... 4

4. Femora with much yellow (Nevada, California)........ **A. illustre**, Cresson

Femora black (Nevada)..............**A. conspicuum**, Cresson

Dianthidium singulare var. **perluteum**, T. & W. Ckll., n. var.

Female, length 12½ mm., expanse of wings about 24 mm.; clypeus yellow without any central black dot; supraclypeal mark triangular; yellow bands on first two abdominal segments entire (i. e. not interrupted), with large, rounded, sublateral posterior notches; abdomen strongly punctured.

Two collected by Dr. Davidson; Wilson's Peak and Strawberry Valley, California. It is much to be desired that the habits of this remarkable insect should be made known.

Anthidium illustre, Cresson.

Nevada is the type locality. Fowler has described the male from Redlands, California. Dr. Davidson has collected two females and a male at Los Angeles.

Anthidium serranum, n. sp.

Male, length about 15½ mm.; similar to male **A. illustre,** but not so large, and the pubescence, even on thoracic dorsum is white; the color and markings are practically the same in the two species. The last dorsal segment of the abdomen is yellow, and not so deeply notched as in **A. illustre,** the incision being about twice as broad as deep, with rather a curved margin, whereas in **illustre** it is more angular, with straight sides; the median tooth (at the bottom of the incision) is narrow and black, and is separated by a yellow area from the black longitudinal mark at the base of the segment, whereas in **illustre** this tooth is very broad (triangular) and broadly united by a black band with the base of the segment. The genitalia are of the same type in both species, the parts in **illustre** being more robust. **A. serranum** has a yellow mark on the scape, and the third antennal segment shows a yellow spot.

Hab.—Rock Creek, Calif., one specimen taken by Dr. Davidson. Named after Father Serra, the founder of the California missions.

Trypoxylon apicalis Fox--Its Nesting Habits.

BY DR. A. DAVIDSON

This wasp is somewhat frequently met with in the neighborhood of Los Angeles. The young are bred in the hollow stems of plants, the parent apparently utilizing any suitable stem of a medium size. The variable diameter of the stems occupied by this wasp, and the frequent discovery of other species of wasps or even bees, in the same cavity has led me to infer that this species does not usually excavate its own nesting site. The hollow stem adopted is divided into cells by concavo-convex discs of clay, the concavity in every instance facing upwards. These discs are inserted at very irregular intervals, so that the cells vary from half an inch to four inches in length. The cocoons are straw colored, fragile, diaphanous shells one-half inch long, and one-eighth of an inch wide. If, as frequently happens, the cocoon when woven is too small to fill the cavity in which it lies it is not as is most frequently the case with other wasps simply attached to the sides, but is neatly suspended in the center of the stem cavity, so that on cross section it appears like a wheel with the cocoon as a hub and the irregular suspending threads as spokes. The suspending threads are frequently very few in number, in one instance I found it centrally supported by only four threads. The suspending of the cocoon must in

this instance have been a delicate operation, though no doubt the erect position of the stem favored its accomplishment. Originally I was under the impression that the food supplied the larvae consisted of caterpillars, as no remains of food were to be found in the cells, but examination of the cells in the early part of the season showed that spiders alone were supplied as food, and these, strange to say, were all of one species, viz., Linyphia. . . . Five to six were the number usually supplied to each cell. All the smaller species of wasps here who feed their young with spiders apparently capture indiscriminately any small species of spider, so that as far as my observations go, this Trypoxolon is unique in supplying one species only. Necessity rather than instinct is probably the explanation of this.

The Trypoxolon appears very early in the season and completed cells may be found as early as February. At this time few spiders have left their winter quarters, but among the earliest to leave are Linphya and these are to be found in numbers at this season. These spiders have, besides a habit of spinning their webs over the water, which renders them more easily observed, and these circumstances probably in a great measure determine the Trypoxolon's choice of this insect as food for its larva.

Prehistoric Man and his Development.

BY DR. LORENZO G. YATES, F. L. S.

Honorary Member Southern California Academy of Sciences
President of the Santa Barbara Society of Natural History, Etc.

In the present state of our knowledge of the history of mankind the word prehistoric is of varied application and uncertain meaning, changing, as it must do, according to the region or country to which it is applied, and the extent of the time which it is supposed to cover, is continually and rapidly being extended by exploration and discoveries.

For a long time Denmark claimed the credit of the discovery of evidence of the existence of man in the ages before written history began. The historic period of Scandinavia began about A. D. 1000, and the earliest examples of history writing in that part of Europe are the Runic inscriptions and poetic legends of that country called "Sagas," inscribed upon stone monuments and other places, which the antiquarians of the past century delighted to study.

This study led to the discovery of the Kjokenmoddings, the Danish name for kitchen refuse, in which were found large numbers of stone implements, weapons and other interesting relics of man's handiwork.

It was found that these relics could be properly divided into three divisions, which would represent three different stages of advancement, called the Age of Stone, Age of Bronze, and Age of Iron.

Each of these ages had continued for a long period, and reached a high degree of perfection, and from these objects much was learned of the early history of man in that region.

In 1853 public attention was called to the discovery of the relics of the Swiss Lake Dwellers of prehistoric times, where different stages of advancement were found, and the further discovery was made that, while the men of ancient Denmark polished their stone implements, there had been a previous race whose implements were only chipped or flaked, and the Stone Age was divided into the Paleolithic or Ancient Stone Age, and Neolithic or Recent Stone Age.

From the time of the discovery of these facts, prehistoric anthropology has advanced to an important rank among the sciences.

It was learned that Egypt and China had written history before the dawn of civilization in Europe, and the historic period for those countries extended back into the more remote ages of antiquity, and more recent discoveries resulting from systematic exploration of the sites of ancient and long buried cities of Assyria and other regions, have demonstrated the use of written characters by which fragments of the history of long forgotten nations and peoples are brought down to us, have carried the Historic Period to and beyond the time when, according to former belief, the world itself had not been formed.

For a long time the markings and hieroglyphics on the ruins and buildings of Ancient Egypt and Assyria were looked upon as mere ornamentation, or evidence of rude artistic taste of the builders, but the long continued study of enthusiastic antiquarians resulted in the discovery that the hieroglyphics were symbolic characters, whose combinations formed picture writings readily deciphered and interpreted, and that other curious combinations of peculiar markings were examples of certain dead languages, used by peoples and nations, whose existence had been previously conjectured from tradition, or casual mention in the mythical writings of antiquity.

One of the most important aids to the interpretation of ancient writings was the discovery of the famous "Rosetta Stone" which contains three inscriptions. The first in hieroglyphic or picture writing—styled by the Egyptians, "writing of sacred words,"—was used on monuments and buildings.

It is the oldest form of writing known.

The second is demotic, the style in general use among the

Ancient Egyptians for decrees and other public acts, contracts and private transactions.

The third in the Greek language, which gave a key to the others.

The inscriptions are to the same purport in each, and were inscribed more than two thousand years ago.

One of the latest discoveries of importance shows that a high state of art, and an advanced degree of civilization existed in the Tigro-Euphrates Valley nearly six thousand years ago. Another was the engraved code of laws of Hammurabi, king of Babylon 2250 B. C., and discoveries and inscriptions showing that a civilized, city-building people built a city on the site of Nippur, the principal city of Babylon, between six and seven thousand B. C.

By the labor and research carried on by the Babylonian Expedition of the University of Pennsylvania, thousands of inscribed tablets have been found, which when fully deciphered, will afford us a first accurate estimate of the remarkable height of Babylonian civilization.

The excavations of this expedition revealed not only the oldest known sanctuary, library and school, but also the most ancient Archaeological Museum.

The earliest inscription found in this ancient museum, though somewhat fragmentary, contains the titles of Sargon I, 3800 B. C., a portion of history written nearly six thousand years ago.

THE EVOLUTION OF MAN, AND HIS MIND

In this age of research and invention, when explorations are being made by individuals, scientific societies, and state and general governments, for the purpose of becoming better acquainted with the world of today; other explorations are being carried on, and a large number of thinking people are turning their attention to the study of the Ancient, or Prehistoric World, and its inhabitants, and the simplest objects unearthed by excavation and explorations made on the sites of ancient, unknown or long-forgotten cities and dwelling places and graves of mankind, are utilized and compared by systematic study in the efforts to gain information relative to prehistoric man, and his advancement from savagery and barbarism to civilization.

It seems but yesterday that aside from the few reliable incidents brought down to us by written history, and the fabulous traditions passed down to us by our ancestors—comparatively nothing was known of nations and races of men who inhabited the earth thousands of years before our written history began.

Man had not discovered nor opened up the Great Book of

Nature, by which geology now enables us to read the history of the earth's crust, and trace the changes which have taken place for unknown millions of years, from the evolution of our planet from its primal gaseous state, to its present solidity.

We find recorded the advent of plant life, followed by that of animals, and the changes in form of the millions of these organisms, which have followed each other in a continuous and unbroken procession to the present day.

As the earth evolved from the gaseous form through varied conditions to the wonderful combination of mineral, plant and animal life of the present, leaving its history imprinted in the rock formations now constituting its crust, and still adding to its rock-written history from day to day, so mankind has evolved from some primal life principle or protoplasm, by a process which we do not understand, and can only attempt to explain by questionable theories and conjectures.

With all our boasted knowledge of the twentieth century, we can no more understand the origin of life than we can comprehend the immensity of space, or an unlimited eternity.

It was but yesterday that man was scarcely the superior of the brute, living in caves, with scarcely a desire beyond the means of satisfying his animal appetite, in which condition portions of the human race are found today.

Other portions, with the advantages of better environment, made more rapid progress and developed intellectual facilities whereby they were enabled to rise above the other orders of animals, and in due time dominated the earth, and formed crude systems of government.

At first brute strength was relied upon, and those endowed with extraordinary courage ruled and enslaved their weaker brethren, and a system of continuous warfare was carried on among communities, and between rival families.

As the mind of man developed intellect, consequent acquirement of useful knowledge by the more intelligent members of communities enabled them to displace those who depended entirely upon their brute strength for their influence over their fellows.

The evolution of the mind generated a desire to possess a method by which their ideas could be communicated to each other.

This desire evolved a system of natural gestures, and eventually a sign language.

It is probable that vocal sounds were used to accentuate the gestures and manual signs. As the necessity of a medium for the exchange of ideas between individuals increased in accordance with the growth of the mind, the crude vocal signs were

elaborated and crystallized into words and sentences by which their desires and wishes were made known to each other; and later, incidents and observations made known, and still later, traditions of the historians of their own times transmitted to their descendants, thus forming oral history and traditions which were by this means perpetuated through the ages.

Written history was evolved at a much later period of man's history, commencing with rude outlines of familiar objects pecked on the surfaces of rocks, the wall of the cave dwellings, and the bark of trees. The meaning of these figures would be obvious to all observers.

These figures of animals and other natural objects were afterward modified and conventionalized until historical incidents, geneological histories, and finally, abstract ideas were represented by these modified and conventional figures.

From these simple results of the gradual evolution of man's mind have come all our spoken and written languages, and the comparatively little we know of the wisdom of past ages, and forgotten people.

The knowledge which we have thus obtained comes down to us as incontrovertible evidence of the gradual but cumulative evolution of the mind of man, and the resultant growth of his intelligence and scientific attainments.

Until within comparatively recent times, the inhabitants of European countries considered themselves to be in possession of all the historical and scientific knowledge of the world, and that outside of their limited range of observation very little was worthy of consideration.

The desire for the acquisition of further knowledge as a result of improved education and growth of intelligence, caused some of the more intelligent people to break through the wall of ignorance and superstition which for centuries had enveloped their minds, and some of the more adventurous among them visited regions and countries until then unknown. They discovered that other nations and races of people had advanced to conditions of civilization, which, while differing from their own, were, in some respects, equal if not superior to them.

In many instances, ruins of magnificent temples, erected to unknown gods, and other evidences of the former grandeur of the people who had formerly inhabited the regions.

Even then, the wonderful sculptures and pictorial inscriptions with which many of the ancient works of man in Egypt, Assyria, India, and other countries were covered, were looked upon as unique examples of barbaric art, and supposed to have been intended for ornamentation only.

After enthusiastic archaeologists had, by close observation

and long continued study, discovered that the millions of examples of supposed architectural ornamentation were in reality word paintings, recording events in the lives of peoples and their rulers of thousands of years ago, and the scholars of the present, by the discoveries of keys to some of the systems of ancient languages, are enabled to read these records of long forgotten peoples as readily as we read the pages of a book.

PUBLICATIONS RECEIVED.

"Standards of Purity for Food Products." U. S. Dept. Agriculture Circular No. 10.

"The Influence of Environment upon the Composition of the Sugar Beet, 1902." U. S. Dept. Agriculture, Bureau of Chemistry, Bulletin No. 78.

"The Testing of Road Materials." U. S. Dept. Agriculture, Bureau of Chemistry, Bulletin No. 79.

"An Experimental Investigation Into the Flow of Marble." Dept. Geology, No. 11, McGill University.

"Muhlenbergia." By A. A. Heller. Vol. I. No. 3.

"Some Practical Suggestions Concerning Seed Germination." No. 50, Agriculture Exper. Stat., University of Arizona.

"A Brief Account of the Principal Insect Enemies of the Sugar Beet." Division Entomology, Bulletin No. 43, U. S. Dept. Agriculture.

"The Colorado Rubber Plant." Bulletin Colorado College Museum, No. 1.

Transactions for January, 1904.

ASTRONOMICAL SECTION.

January 18th, 1904.

The meeting of the Section was presided over by Chairman Knight, who introduced the exercises of the evening by remarks on the Leonid meteors of November, 1903, giving extracts from observations in England and points on Continental Europe.

Mr. Knight illustrated on the blackboard a theory of the meteoric phenomena, claiming that the Leonids move in the orbit of a comet, which extends beyond the orbit of Uranus, and that they are probably distributed in bunches or groups throughout the orbit.

That the earth, in its orbital motion, may when it reaches the point of intersection of the two orbits, strike one of these groups, giving rise to an extensive meteoric shower; or it may strike a vacant space between two groups, giving rise to the absence of any large number of meteors.

The chairman also exemplified the interesting theory of the revolution of binary stars about a common center, and the remarkable agency of the spectroscope in determining the direction of stellar movements.

The chairman then introduced Prof. George E. Hale, director of the Yerkes Observatory, as one who had acquired fame as a careful observer and as the inventor of the spectrohelioscope.

Prof. Hale displayed many photographs taken at the Yerkes Observatory representing the various instruments in use, the methods of procedure, and a number of the heavenly bodies. He spoke at some length of the work being accomplished in the closer investigation of the compo-

sition and characteristics of the sun and other bodies, and of the search being made for atmospheric conditions more favorable to the photographic investigations now being conducted by the Observatory.

That being the special official mission of Prof. Hale to this section of the state, it was gratifying to learn that he had found certain features of this atmosphere in the mountainous regions very favorable to good results, expressing the hope that it would lead to the establishment of a branch of the Yerkes Observatory in this vicinity. Prof. Hale exhibited a mastery of his subject that rendered his remarks lucid, interesting and instructive.

After thanks to the speaker, the section adjourned.

MELVILLE DOZIER, Secretary.

BIOLOGICAL SECTION

Los Angeles, Cal., January 11th, 1904.

The meeting was called to order by the chairman, Prof. A. B. Ulrey. The minutes of the last meeting read and approved.

The first lecture of the evening was by Dr. Louisa Burns on the subject of "The Nissl Bodies." The lecture was illustrated by camera lucida, drawings made by the lecturer, and by a number of microscopical slides made by herself. The lecture gave evidence of the most care-taking and accurate preparation.

The lecture was discussed at considerable length by a number of those who were present.

Ehrlich's hypothesis of immunity was explained at some length by C. A. Whiting. The subject was discussed at length by a large number of the people present.

About forty members and visitors were present. On motion the meeting adjourned to meet again on the second Monday in February.

C. A. WHITING, Secretary.

GEOLOGICAL SECTION.

Los Angeles, Cal., January 26, 1904.

The Geological Section met at the Woman's Club Rooms on the evening of the 25th inst. Minutes of previous meeting were read and approved. The secretary read an article on a recent reported discovery by the use of radium, which claimed that by the radium rays the spirit of a dead animal could be seen passing out of the body after death.

Chairman George W. Parsons then introduced Mr. E. M. Wade, who, with a few remarks, exhibited the action of platinum and hydrogen, showing a red heat when united. Dr. Arthur D. Houghton gave a very interesting and scientific lecture on the line of the radio-activity of metals.

Mr. Wade then exhibited a tube of radium and a specimen of uranium after the meeting was over. The meeting was well attended.

G. MAJOR TABER, Secretary.

NOTES AND NEWS.

The University of California has engaged Prof. Hugo De Vries, of Amsterdam to lecture at the forthcoming session of the Summer School of Forestry. Prof. De Vries has attained much fame by his investigations of plant mutation. He believes that species characters arise suddenly and that they are ordinarily stable from the moment they arise.

Reclamation of drift sands in Cape Colony, C. D. H. Braine (Agr. Jour. Cape Good Hope, 23. (1903).—A description of the extent and character

of the drift sands of Cape Colony, with some account of the government attempts to reclaim these areas, and analyses of Eerste River drift sand at different depths and periods. The method of reclamation followed has involved the spreading of town refuse on the sand and the planting of sand-binding trees and grasses. The average cost of five years' reclamation work at Eerste River was $48.74 per acre. The trees found most useful for planting on the sands were Acacia saligna and A. cyclopis. Various species of Eucalyptus have also been planted with more or less promise of success.

"The Fabricia (Leptospernum loevigatum) propagates readily, and is most effective in arresting sands in warm climates. Other useful trees are the Tamarix gallica, Widdringtonia cupressoides, and the Cupressus macrocarpa. . . . Of the grasses used in the Cape Colony, by far the most successful is the Ehrharta gigantea or pypgrass, the vigor of its growth far exceeding that of any other. Perhaps the most useful is the indigenous Triticum junceum, which is being used on the exposed littoral dune at Port Elizabeth, as it thrives well near the sea. The Elymus arenarius does not grow freely on the driest parts of the sands, and has, on the whole, shown poor germination, although in some cases healthy and strong. Extensive experiments have been made with marram grass (Psamma arenaria), also known as Ammophila arundinacea and Arundo arenaria, but the results have been very disappointing. . . . Other useful grasses are the Cynodon dactylon and Sporobolus matrella, which were self-introduced at Eereste River and grew vigorously. The Panicum and Stenotaphrum are also indigenous grasses that do well on sandy soils."

In No. 3, Vol. 1. of Muhlenbergia, Mr. Heller describes a number of new labiates from California, chiefly in Monardella and Scutellaria, and has begun a series of papers on "Western Species New and Old." A new Lupine is described by J. W. Congdon.

Experiments at the Michigan Agricultural Station on the warding off of frost by the use of extensive fires of wood resulted in keeping the temperature 2 degrees above the surrounding uninfluenced portion of the orchard.

T. D. A. Cockerell (Bulletin of the Colorado College Museum No. 1) describes a new Picradenia, the roots of which have been found to contain considerable quantities of rubber. The author has reviewed the genus and describes one new species and two subspecies.

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A Preliminary Synopsis of the Southern California Cyperaceae.

BY S B. PARISH.

The Sedges have been neglected by most Southern California botanists, and consequently they are represented but scantily in collections. The number of the species, therefore, and their distribution, are known very imperfectly. It seems desirable that our knowledge should be augmented, and made more accurate; and it is to facilitate this end that the present paper has been prepared.

All the species now known to occur in the southern counties are described, and their distribution indicated, so far as the scanty material permits. With the exception of a few rare species, specimens of which I have not been able to see, the descriptions are drawn directly from Southern California plants.

Besides my own material I have had access to that belonging to the University of California, and to the collections of Mr. T. S. Brandagee and Dr. A. Davidson. My thanks are due to Mr. H. M. Hall, and to the two gentlemen named, for this opportunity, and also to Dr. N. L. Britton, Dr. L. H. Bailey and Prof. C. F. Wheeler for valuable assistance.

The plate of Cyperus bromoides is from a drawing made at

the New York Botanical Garden, under the direction of Dr. Britton; the drawings for the other plates were made by Miss Clara P. Colgan.

Cyperaceae.

Grass-like or rush-like herbs, with triangular, quadrangular, terete, or flattened, mostly solid, culms, and alternate, mostly radical, leaves with closed sheaths, or leafless. Flowers perfect or imperfect, solitary (rarely 2) in the axles of imbricated bracts **(scales)**, in 1-many-flowered, solitary or clustered spikelets. Perianth hypogenous, of bristles or inner scales, or wanting. Stamens usually 1-3; anthers basifixed, 2-celled. Style 2-3-cleft, rarely simple or 2-toothed. Ovary 1-celled, sessile or stipitate, containing a solitary erect anatropous ovule. Fruit a lenticular or 3-angled achene. Embryo minute, at the base of the copious endosperm.

A family of over 60 genera, and some 3,000 species; of world-wide distribution, but most abundant in the temperate portions of the northern hemisphere.

The two families, the Gramineae, or true Grasses, and the Cyperaceae, or Sedges, constitute the order Graminales, characterized by the production of the flowers in the axles of chaffy scales, which are arranged in spikes or spikelets. In the Gramineae the fruit is a caryopsis, or grain, and the culms are, with few exceptions, hollow; in the Cyperaceae the culms are mostly solid, and the fruit is an achene.

Key to the Genera.

Flowers all perfect; spikelets all similar.
  Scales of the usually flattened spikelets 2-ranked.
    Rachis straight. **1. Cyperus.**
    Rachis flexuous above. **2. Schoenus.**
  Scales of the spikelets spirally imbricated all around.
    Dilated base of the style persistent as a tubercle. **3. Eleocharis.**
    Style wholly deciduous.
      Perianth wanting; style ciliate. **4. Fimbristylis.**
      Perianth of 1-6 bristles, rarely 0; style glabrous. **5. Scirpus.**
      Perianth a minute hyaline scale. **6. Hemicarpha.**
Only the terminal flower perfect. **7. Cladium.**

Spikelets monoecious, androgynous, or rarely dioecious; achene inclosed in a utricle. **8. Carex.**

1. Cyperus, Linn. Sp. Pl. 44. Galingale.

Annual or perennial herbs with simple triangular or subterete culms, leafy at base. Infloresence subtended by conspicuous leafy involucres, irregularly umbellate with unequal rays and a sessile central spike, or capitate. Flowers in flattened or subterete spikelets of few or many scales. Scales concave, more or less carinate, 2-ranked, deciduous or persistent, 1-2 of the lowest usually empty. Perianth none. Stamens 3. Style 2-3-cleft, wholly deciduous from the summit of the 3-angled or lenticular achene.

About 650 species are recognized, natives of temperate and tropical regions.

Key to the Species.

Styles 2-cleft; scales deciduous from the persistent rachis.
  Achenes little flattened.
    Achenes oblong. **1. C. melanostachyus.**
    Achenes ovoid. **2. C. bromoides.**
  Achenes plano-convex. **3. C. laevigatus.**
Styles 3-cleft; achenes 3-angled.
  Scales deciduous from the rachis of the flattened spikelet.
    Scales with incurved setaceous tips. **4. C. inflexus.**
    Scales destitute of setaceous tips.
      Wings of the rachis separating to the base; annuals.
        Wings persistent on the rachis. **5. C. erythrorhizos.**
        Wings readily deciduous. **6. C. Parishii.**
      Wings whole adnate to the rachis; perennial. **7. C. esculentus.**
  Spikelets decidous from the axis of the spike.
    Spikes oblong, compact; spikelets slender. **8. C. speciosus**
    Spikes short, loose and spreading; spikelets broader. **9. C. longispicatus.**

Catalogue of Indian Relics Found on Santa Catalina Island; In the Museums of Los Angeles Chamber of Commerce*, The Smithsonian Institute, and Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, Mass.

BY MRS M BURTON WILLIAMSON

The writer acknowledges her great obligation to the following, for a complete list of Santa Catalina Indian relics in the above named Museums: Mr. Frank Wiggins, secretary Los Angeles Chamber of Commerce; Mr. W. de C. Ravenel, administrative assistant United States National Museum, and Prof. F. W. Putnam, curator and Peabody Professor American Archaeology and Ethnology.

OBJECTS IN CHAMBER OF COMMERCE, LOS ANGELES.

EXPLORATION BY DR. F M PALMER

(The number refers to catalogue number. Those found in shell mounds are marked M., surface finds, S., and those unmarked in graves.)

Bone Implements.

No.

60—Implement $4\frac{1}{2}$ in. long., use unknown.
68—Sword blade, $13\frac{1}{2}$ in. long, $1\frac{3}{4}$ in. wide.

Ornaments of Stone.

101—Pendant, serpentine.
140—Ring, serpentine.
173—Charm, fossil.

*The collection in the Chamber of Commerce contains relics from all the islands of Southern California as well as those found on the mainland. Some other islands on this coast are represented by a larger number of objects than Santa Catalina Island. The large local collection was made by Dr. F. M. Palmer and afterward purchased by the Chamber of Commerce of Los Angeles, Cal. The city is greatly indebted to Mr. Frank Wiggins, the indefatigable secretary of the Chamber of Commerce, for his influence in securing these relics and those from the other Santa Barbara islands in Los Angeles county.

No.

174 to 176—Charms, fossils.

240—S. Implement used in the manufacture of soapstone vessels.

241—S. Saw, sandstone.

242 to 246—Polishing stones.

247—Hammer.

250 to 258—S. Chisel points, probably used in making steatite vessels; they are from 2½ to 7 inches in length; were taken from the steatite quarry on the Island.

Shell Ornaments.

293 to 298—A series of beads of the largest sizes, sections cut and ready for being perforated; also a shell **Tivela crassotelloides**, from which they were all made.

317—Pendants, abalone **(Haliotis.)**

333—Dress ornament, abalone.

327—Breast ornaments, abalone.

339—Buttons, abalone.

340—Pendants, abalone.

342—Dress ornaments, abalone.

346—Mosaic inlays, abalone.

348—Pins, columella of a shell.

350—Beads, **Tivela cressotelloides.**

363—Beads, **Tivela cressotelloides.**

377—Necklace, 32 inches long.

Glass and Enamel Beads.

380—Necklace, 78 inches long.

381—Necklace, 84 inches long.

384—Necklace, 77 inches long.

Chipped Stone Implements.

592 to 600—Arrowheads.

606—Pipe, 2¾ inches in length, greatest diameter one inch, a mouthpiece made from wingbone of a bird is fastened by asphaltum in the opening at the small end. Material red sandstone.

612—Cylindrical stone tube 10 inches long, 6 inches circumference. The implement is finely made of black serpentine.

614—Spoon-shaped implement, mottled green and white stone, length 3¾ inches.

615—As above.

623—Mace-head, polished, diameter 2¾ inches, thickness 1 inch, perforations ⅞ inch. Green serpentine.

628—Mace-head, polished on one side. Ornamented on polished surface by incised lines making five crosses. Green serpentine.

No.

637—Fish-stone. Representation of a "fin-back whale."

642—Hook-shaped implement, length 6 inches, width 4 inches, thickness 2 inches. Gray serpentine.

643—As above, length 3½ inches. Serpentine.

644—As above, length 2½ inches. Serpentine.

646—As above, length 1 inch. Serpentine.

662—Spike-shaped implement of close-grained dark sandstone, one of the finest wrought pieces in the entire collection. Dr. Palmer lists this as unlike, in form, anything catalogued elsewhere.

664—Cup, 2¼ inches in diameter, 1¼ inches high, resembles a cup in a saucer. Pink serpentine.

667—M. Cup with handle. Beautifully made. Dark green serpentine.

669—Cup, 4 inches in diameter, 2 inches high. The bottom of this specimen has been carved to make a standard upon which the cup rests. Green serpentine.

Cooking Pots.

680—Griddle or cooking stone, 6 inches in length, 4 in width. Steatite.

681—Griddle or cooking stone, 4½ inches in length, 4 in width. Steatite.

682—Griddle or cooking stone, 5 inches in length, 2½ in width. Steatite.

683—Griddle or cooking stone, 5 inches in length, 4 in width. Steatite.

685—Polishing stone. Serpentine.

686—Polishing stone. Serpentine.

706—Use unknown. Serpentine.

Metates or Mealing Stones.

756—M. Spatula, for use in preparing and applying asphaltum. Shale.

766—Cup of gray serpentine—form like the bowl of a spoon.

772—Discoidal stone of green serpentine, probably a macehead.

803—Spoon, abalone—**(Haliotis.)**

818—Paint-pot containing black paint. Shell.

823 and 824—Cups of Haliotis, the holes closed with asphaltum.

825—Cake of red paint.

838—S. Unfinished pot. Steatite.

839—S. Pot form—opening just commenced.

838 and 839—From an old quarry on the Island.

Paul Schumacher Collection.

Cat. No.
U. S. N. M.

1,834-51—Soapstone plates, 7 specimens.
18,352-4 —Soapstone cup or mortar? 3 specimens.
18,355-8 —Stone pestles.
188,359 —Stone ring (club head), 1 specimen.
18,360 —Animal figure carved in stone (hind quarters only), 1 specimen.
30,184 —Black flinty pebbles (for money)? 14 specimens.
30,185 —Ear pendants of Haliotis shell, 10 specimens.
30,186 —Bone perforator, 1 specimen.

Dr. W. H. Hall Collection.

15,100 —Unfinished stone mortar.

In the Dall collection from San Miguel Island, numbered 14,984 to 15,072 inclusive, containing mortars, pestles, stone club heads, etc., etc., occurs the following note:

Only a few of these from Santa Catalina Island and those exactly like the San Miguel specimens which compose the rest of the lot.

Explorations Paul Schumacher, Smithsonian Institution, 1875.

Peabody
Museum.
No.

9,268—Cooking stone.
9,269—Cooking stone.
9,270—Cooking pot, small.
9,271—Pestle, small.

Exploration of Paul Schumacher for Peabody Museum, Harvard University, 1877.

Graves at the Isthmus.

Peabody
Museum.
No.

13,116 to 13,122—Double whistle bone.
13,123—Bone whistle 13. Fragments.
13,124—Bone implement.
13,125—Bone implement daggers, 12.

Prehistoric Man and his Development.

BY DR. LORENZO G. YATES, F. L. S.

Honorary Member Southern California Academy of Sciences
President of the Santa Barbara Society of Natural History, Etc.

Among the many interesting discoveries of late years in Assyria is the Code of King Khammurabi, giving the laws which governed his people 4,000 years ago, and there are ample evidences that many of the laws therein codified had been brought down from much greater antiquity.

This Code gives proof of the existence of the tradition of the "mountain-given law" long before the Mosaic reception on Sinai.

At Nippur, the sacred city of the mountain god Bel, the scientific explorations of the ruins of the oldest cities of Chaldea by the party sent out by the University of Pennsylvania, under the direction of Dr. Hilprecht, uncovered twenty-one strata of successive towns and cities upon the site, extending over a period from Arab times, about A. D. 900, to probably a period of 5,000 years before the Christian era, and from the evidence of vestiges of buildings, and the recovery and translations of ancient inscriptions the earliest settlement cannot be placed later than 7,000 years ago.

An important point in this discovery is that there was absolutely no trace of any prehistoric, neolithic, nor paleolithic age, and there was no period during the time of the occupation of this site when writing was unknown, and there was no Stone Age represented in that locality.

This ancient civilization seems to have been brought by emigrants from some other region, among whom writing had advanced beyond the pictorial stage.

Copper and silver were worked by these people and a silver tariff had replaced a corn standard.

Other discoveries to the east of the River Tigris indicate older settlements showing three different stages of the Neolithic or Later Stone Age, showing, either that the emigration had been from the east, and that its advance had been very slow, or that the people living in the Stone Age of the earlier settlement had been driven out by a people who were already equipped with the first elements of civilization which must have taken centuries to develop.

M. W. Flinders Petrie judges from the pictures of ancient men with full foreheads and aquiline noses that in the early

man of Egypt we find a European race more or less mixed with the Negro. He says that there are 9,000 years' unbroken chains of events in Egyptian history, and yet we are far from the beginning. There are traces that civilization must have come in from another country with copper and fine work in flint and stone, and good pottery.

In the earliest graves, figures of a race of the Bushmen type were found similar to those found both in France and Malta, suggesting that the race may have extended over Africa into Europe. There were figures of captive women of the earlier race which were Paleolithic.

Aside from all tradition it would seem that the portion of the earth's surface now occupied by the South Pacific ocean was once dry land, of which portions of Australasia and some of the islands represent all that now remains of a once immense continent which has been destroyed by volcanic action, which is still at work with diminished force.

The researches of geologists have shown that extensive areas of the dry land of the present have been, and still are, covered by volcanic matter, the source of which cannot be satisfactorily accounted for. The known extinct and active volcanoes are sufficient to account for but a small proportion of the great number and extent of ancient overflows.

The great lava flow of the northwestern portion of the American continent covers Northern California, part of Nevada, Oregon, Washington, Oregon, Idaho, and far into Montana and British Columbia. It is said to cover not less than 150,000 square miles, and in some places more than thirty successive layers are shown, extending in some places to a depth of perhaps 3,000 feet. In India 200,000 square miles are covered from 2,000 to 6,000 feet thick without a visible volcano from which the lava could have come.

Where there are great eruptions of melted matter from the interior of the earth there must result corresponding cavernous chambers beneath the surface, which upon the ingress of the waters of the ocean are, by contact with the incandescent heat, changed into superheated steam, with incalculable explosive power sufficient to destroy islands and portions of continents.

Many such instances have occurred within historic times and where the earth's crust is thus displaced the water of the ocean fills the depression.

An instance of remarkable volcanic energy in historic times is presented by the blowing off of a volcanic cone called Papandayang in the Island of Java, by which it is estimated that about thirty billion cubic feet of material was thrown into the atmosphere in a single night, the mountain was reduced

from its height of 9,000 feet to 5,000 feet and a vast crater left in its midst.

*Ency. Brit.

If such results are possible in the present comparatively feeble action of volcanic force, it seems probable that in the earlier periods of the earth's history, intermittent catastrophic action resulted in immeasurably greater destruction of the earth's surface.

When we consider that nearly all of the present dry land of the earth consists of marine deposits of material derived from older formations of rocks thousands of feet in thickness, the question arises, **Where** were these older formations located, and **What** has become of the remnants?

We know by incontrovertible evidence of the rocks and their inclosed fossil remains that the earth's crust has been subjected to continuous alternations of elevation and depression, and what was dry land as continents and islands in one period of the earth's history became the bed of the ocean in another period, and new islands and continents were raised from the bed of the former ocean, bringing up its records. The records of the animal and vegetable life of the submerged land were buried in the bed of the new ocean, there to remain for perhaps millions of years, until the wheel of time shall bring them again above the ocean level, and supply some future race with many of the missing pages of the Book of Nature.

Among these missing pages it is probable that the records of man in the earlier stages of his evolution may be buried.

What would be the result should the continents of the present be submerged, leaving only portions of the highest ranges of mountains and islands above the surface of the water?

The thickly populated countries would be absolutely destroyed, a few human beings might escape the catastrophe, and proceed with Nature's plan of evolution, as it has always been.

PUBLICATIONS RECEIVED.

"Wheats and Flours of Aristook County." Maine Agricultural Experiment Station. Bulletin No. 97.

"Fourteenth Annual Report." University Arizona Experiment Station.

"Some Insects Attacking the Stems of Growing Wheat, Rye, Barley and Oats." U. S. Department Agriculture. Division Entomology. Bulletin No. 42.

Transactions for February, 1904.

ACADEMY OF SCIENCES.

Los Angeles, Cal., February 1, 1904.

The regular meeting of the Academy of Sciences was held at the Club House. President Theo. B. Comstock and Secretary B. R. Baumgardt being absent, Professor Melville Dozier was called to the chair and G. Major Taber appointed secretary pro tempore.

The chairman announced that at the regular meeting in April the following officers would be elected:

President, Vice President, Secretary and four members of the Board, and that at the regular meeting in March the names suggested by the Board would be announced, subject to the ratification of the Academy.

The chairman further announced that at the meeting of the Astronomical Section, February 15, Professor G. E. Hale would deliver a lecture.

Professor Julius Koebig was then introduced and gave an interesting lecture on "Food and Food Products and Their Adulterations."

He opened his remarks by stating that: "Life is an undiscovered mystery, and it is necessary to study chemistry to obtain the best results for sustaining it." He also stated that with strict vegetable diet there would be on an average 15 days sickness in the year, while with a mixed diet the number of days would be reduced to three.

He explained by charts the relative nutriment contained in both vegetables and meats.

The lecture was scientific and instructive. Questions were asked by the audience and answered by the speaker. Several members of the Chemical Club were present.

Adjourned. G. MAJOR TABER, Secretary pro tem.

Los Angeles, Cal., February 1, 1904.

The Board of Directors of the Academy of Sciences met at 7:30 p. m. at the Woman's Club Rooms. Present, Wm. H. Knight, Melville Dozier, George W. Parsons and C. A. Whiting.

President Theo. B. Comstock and Secretary B. R. Baumgardt being absent, Professor Melville Dozier was appointed chairman and G. Major Taber secretary pro tem.

The following applications were read, and by a vote of the board were elected to membership:

M. R. Preston, 412 South Hope street, Los Angeles.

A. G. Adams, 906 West Seventh street, Los Angeles.

L. H. Banister, Station "A," Pasadena.

Paul F. Mohr, 423 Byrne Building.

G. W. Vosburg, 1242 West Lake avenue.

Mrs. Sophia A. P. Wheeler, San Gabriel.

Mr. William H. Knight and Dr. Albert B. Ulrey were appointed a committee to confer with the Chemical Club in regard to forming a union of their club with the Academy of Sciences.

There being no further business the board adjourned.

G. MAJOR TABER, Secretary pro tem.

BIOLOGICAL SECTION.

The meeting was called to order by the chairman of the section, A. B. Ulrey.

The minutes of the last meeting were read and approved.

The lecture of the evening was delivered by Dr. Lyman Gregory on "The Ontogeny and Phylogeny of the Eye." The lecture was illustrated by careful drawings made by Dr. Gregory's pupils.

The lecture was discussed at some length by Professor Ulrey and C. A. Whiting.

A number of slides showing sections of various eyes were exhibited under a microscope.

About thirty members and visitors were present.

On motion the meeting adjourned to meet on the second Monday evening in March. C. A. WHITING, Secretary.

ASTRONOMICAL SECTION.

The occasion was a joint meeting of the Astronomical Section and the Academy, to hear Professor Hale of the Yerkes Observatory in his intensely interesting presentation of the properties and characteristics of the sun.

The speaker was introduced by Secretary B. R. Baumgardt, and opened his remarks by allusions to the striking changes through which observatories have passed in recent years, being now more of the nature of laboratories than of places for mere observation.

The lecturer paid a high tribute to the extent and value of the astronomical work being accomplished in America, and especially of that part which has been and is being contributed by California's great observatory, the Lick.

Professor Hale then introduced the subject proper of his address, the composition and phenomena of the sun, and for an hour and a half delighted and instructed his audience with an exposition of the methods of procedure and the marvelous results obtained in the persistent and arduous investigations that have been conducted at the Yerkes and other observatories, bearing upon the chemistry and physics of the sun.

The lecture was richly illustrated with stereopticon views, taken largely under Professor Hale's own supervision and exhibiting the tremendous possibilities of the spectrohelioscope, an instrument growing out of his own genius and application. After the lecture an informal discussion ensued, during which many questions of interest were asked and answered.

To the great gratification of the audience, Professor Hale spoke in the highest terms of the atmospheric advantages of the mountainous regions of this vicinity for solar observation, expressing the hope that arrangements for a permanent observatory of this character may be established in this neighborhood.

A hearty vote of thanks was tendered to the lecturer for his lucid and instructive exposition, and the meeting adjourned.

February 15, 1904. MELVILLE DOZIER, Secretary.

GEOLOGICAL SECTION.

Los Angeles, Cal., February 22, 1904.

The Geological Section met at the Woman's Club Rooms at 8 p. m. Chairman George W. Parsons called the meeting to order. The minutes of previous meeting were read and approved. The chairman then introduced Professor Frank I. Shepard of the University of Southern Cali-

fornia, a member of the Chemical and Metallurgical Club of Los Angeles, who read an interesting paper on "The Chemical Geology of Sedimentary Deposits."

He said in part, that chemistry had always played an important part in building up the earth's strata which usually occurred near the surface, and that the rivers carried much of this material into the sea, and the larger material was deposited near the shore, and the finer matter was carried further out. He also stated that mineral substances were held in solution, and that in the Lake Superior region the iron was deposited chiefly by precipitation. He asserted that it was estimated that 100 tons of rock material per square mile were dissolved by rain water every year into the sea, and that limestone was formed in vast quantities on the ocean floor, mostly between the surface and at a depth of 2000 fathoms and remarked that limestone played no small part in the formation of iron ores as a carbonate or sulphate being derived from the decomposition of pyrites and other iron-bearing minerals. He quoted several prominent authors who substantiated the opinions advanced. He also stated that the area of the ocean floor was estimated to cover 103,000,000 square miles, and that dead marine animals probably covered the ocean floor six feet in depth for many square miles. He also gave the reports of 160 analyses of sea water collected by the Challenger expedition; stating that of deep-sea deposits on the floor of the ocean, 36.83 were carbonate of lime, and that 90 per cent. was derived from pelagic organisms, and that below 3000 fathoms very little limestone was deposited; that a large percentage of silica is being formed from diatomaceous and radiolarian oozes; that metamorphism changed nearly every kind of sedimentary rock.

There was a general discussion by members and questions were asked and answered by the speaker. The lecture was interesting and of a purely scientific character.

The chairman thanked Professor Shepherd for his interesting and instructive lecture. G. MAJOR TABER, Secretary.

NOTES AND NEWS.

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One eucalyptus tree, **E. naudiniana**, Muller, has been discovered in Mindanao, the most southern of the Philippine Islands (Science No. 457).

Southern California has the distinction of producing some of the most interesting mineral gems that have been discovered of late. Dr. Kunz, at the New York Academy of Sciences, reported the following: Magnificent colored tourmalines from San Jacinto, Mesa Grande and Pala; rose beryl also from the latter localities; lilac spodumene from Pala and Coahuila; spessarite, a garnet of remarkable beauty, from Coahuila and from San Diego; kunzite "in crystals, which for purity and beauty of color are unrivaled by any other mineral in North America."

At Ramona, near San Diego, crystals of pale blue topaz have been found that resemble those of the Ural region. This is the first noted occurrence of this mineral in the state.

The greatest amount of salt detected in beach sand occurred in a sample taken at Los Angeles, 0.15 for the first foot and 0.12 for the second foot, an amount not greater than that sometimes occurring in cultivated land in the United States. We are therefore constrained to attribute the xerophytic character of sand-strand vegetation to factors in the environment other than the presence in the soil of an excessive amount of soluble salt. (The Salt Content of Seabeach Soils. T. H. Kearney.)

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MAILED APRIL 16, 1904

A Preliminary Synopsis of the Southern California Cyperaceae.

BY S. B. PARISH.

* *Styles 2-cleft; achenes lenticular; rachis wingless; spikelets in a simple umbel, or capitate.*

+— *Scales folded and sharply carinate*; *achenes little flattened*; *annuals.*

√ 1. **Cyperus melanostachyus,** HBK. Nov. Gen. 11:207. **C. diandrus capitatus,** Britton, Bull., Torr. Club, **13:205.. C diandrus castaneus,** Watson, Bot. Cal. 2:214.

Culms slender, 4dm. or less tall, about equalling the narrow leaves; spikelets linear-oblong, much flattened, many flowered, 6-10mm. long; involucral leaves mostly 3, narrow, 1-2 of them much elongated: scales ovate, obtuse, 2mm. long, dark brown with pale or green keel; stamens 2-3; achenes oblong, subacute, gray, half as long as the scale.

Common in wet soil, stream banks, etc., in the cismontane region below 1,500 feet altitude. Los Angeles; Braunton, Davidson. San Bernardino; Parish.
by Dr. Britton.

√ 2 **Cyperus bromoides,** Britton, nom. nov. **C. unioloides**

bromoides, C. B. Clarke, Jour. Linn. Soc. 21:60. Britton, Bull. Torr. Club, 13:206.

Culms slender, 4-8dm. tall, exceeding the few rough-margined leaves; spikelets 4-12, lanceolate, flattened, 10-20-flowered, 8-18mm. long; involucral leaves 2-4, the longest 1-1.5dm. long; scales acute, yellow-brown, the green keel 3-nerved, and the margins scarious, about 4mm. long; stamens 3; achenes ovoid, black, about one-third as long as the scale.

Cienega, Los Angeles Co., 1884; Oliver. Near Los Angeles, Aug. 24, 1888, Dr. Hasse. The first of these specimens is in the Gray Herbarium of Harvard University; the second is in the Herbarium of the New York Botanical Garden. The plant is widely spread through Mexico and Central America, but in the United States is known only from the above collections.

PLATE II. Drawn from Dr. Hasse's specimen.

+-† *Scales concave, only slightly carinate; achenes biconvex; inflorescence a sessile and apparently lateral cluster of few spikelets.*

3. **Cyperus laevigatus,** Linn. Mant. 2:179.

Perennial from a wiry rootstock; culms few from each node, subterete, about 1dm. tall, hardly surpassing the erect filiform leaves; spikelets 1-3, ovate, 3-8mm. long, 6-18-flowered; involucral leaves 2, one erect and apparently continuous with the culm, the other very short; scales broadly ovate, obtuse, nearly nerveless, 2mm. long, pale and more or less tinged with rich brown; stamens 3; achenes ovoid, 1.25mm. long, brown and shining, rachis broad, deeply pitted transversely.

Along streams in wet sand. Los Angeles; Davidson. San Bernardino, below 2,000 feet altitude, and Big Morongo, in the Colorado Desert, 3,000 feet altitude; Parish. A species widely distributed in warm countries, but in the United States known only from our region.

** *Styles 3-cleft; achenes 3-angled,*

+- *Scales falling away at maturity from the persistent rachis of the flattened spikelet.*

‡ *Scales tapering into a curved setaceous tip; wings inconspicuous; stamen 1.*

4. **Cyperus inflexus,** Muhl. Gram. 16 Britt. & Brown, Stamen 7. Ill. Fl. 1:137. **C. artistatus,** Boeckl. Linnaea, 35:500, not Rottb. Watson, Bot. Cal. 2:214.

Annual; culms numerous, slender, 2-6cm. tall, about equalling the narrow leaves; inflorescence in a dense head, or 2-3-rayed; involucral leaves 2-3, moderately unequal, 1-6cm. long; scales lanceolate, concave, strongly nerved, green, 1-5mm long; achenes oblong-obovoid, mucronulate, brown, dull, 1-1.5mm. long.

PLATE II

Cyperus bromoides, Britton.

Widely distributed, but nowhere abundant; ascending the mountains to 5,000 feet altitude, and reaching the borders of the Mojave Desert. Strawberry Valley, San Jacinto Mountains: 2623 Hall. San Juan Hot Springs; Nevin. Wet sand banks, Lytle Creek, near San Bernardino, and Mojave River, near Hesperia; Parish. From Ontario and British Columbia to Florida and Mexico.

‡ *Scales acute or obtuse, without setaceous tips; stamens 3; umbel with elongated rays, or rarely condensed.*

‖ *Wings scarious, soon separating from the rachis to the base; annuals.*

5. **Cyperus erythrorhizos,** Muhl. Gram. 20.

Culms rather stout, 1-10m. tall; leaves about 5mm. wide, rough margined, usually exceeding the culms, those of the involucre 4-6, one or two of them much exceeding the rays; umbel simple or compound, few-rayed: spikelets 1-1.5mm long, linear, acute, numerous in the elongated oblong spikes: scales narrowly oblong, 5mm. long, acute, mucronulate, bright chestnut: achenes sharply three angled, oblong, pointed at both ends; half the length of the scale.

Reported in the Botany of California to have been collected "in the Colorado Valley," by Newberry. An immature specimen of Alderson's from San Diego Co., may belong here. From Northern Mexico to the borders of British America.

6. **Cyperus Parishii,** Britton, n. sp.

"Annual with fibrous roots: culms tufted, slender, 1-2.5dm. tall; leaves 2-5 mm. wide, shorter than the culm, those of the involucre 2-7, the longer ones exceeding the inflorescence; umbel simple or somewhat compound, usually several-rayed, but sometimes congested, the rays 0.5-5cm. long, slender; spikelets numerous, densely short-spicate, linear, acute, 12-20mm. long, about 2mm. wide; rachis at length wingless, the narrow wings early deciduous: scales oblong, lanceolate, purple-green, obtuse, about 2mm. long, several-nerved; achenes narrowly obovoid-oblong, nearly black, obtuse, mucronulate, about half as long as the scale, obtusely trigonous.

"Southern California to Arizona and New Mexico. Type, Parish, n. 3816, vicinity of San Bernardino, California, October 15th, 1895." (Britton in lit.)

Growing in wet sand, on the banks of streams. Besides the type, we have it from Rock Creek, Los Angeles Co.; Davidson, and Edgar Canon, 3,500 feet altitude, San Bernardino Mountains; 1887 Parish.

PLATE III. Plant collected at San Bernardino, X ½ – a. Scale X 10. b—Achene X 25.

PLATE III

Cyperus Parishii, Britton.

‖‖ *Wings persistently attached to the rachis for their whole length; perennial by tuber bearing root stocks.*

7. **Cyperus esculentus,** Linn. Sp. Pl. 45. Britt and Br. Ill. Fl. 1:241. **C. phymatodes,** Muhl. Gram. 23. Watson. Bot. Cal. 2:215.

Culms stout, 3-8dm. tall; leaves about 5mm. wide, shorter than the culms, those of the involucre usually 4, the longest exceeding the rays; umbel 7-10-rayed, often compound, the rays up to 1dm. long; spikelets numerous in loose, spreading spikes, 5-20mm. long, 10-20-flowered; scales yellowish brown, ovate subacute, several nerved, 4mm. long; wings narrow, shorter than the achene, only the pointed tip at length free; achenes oblong-obovoid, 1-1.5mm. long, mucronulate at the obtuse summit.

In dry, sandy soil along streams, or a weed in cultivated grounds. Apparently of wide range in the cismontane region below 1,000 feet altitude, but not abundant. Los Angeles; 630, 671 Braunton. Tia Juana; 961 Alderson. San Bernardino; 2227 Parish. Cosmopolitan, and perhaps not indigenous in our region.

†† *Spikelets narrow, subterete, readily detached from the axis of the spike, the lowest pair of scales persisting; wings broad, scarious, wholly adnate to the rachis, and loosely embracing the achene; stamens 3; annuals.*

8. **Cyperus speciosus,** Vahl. Enum. 2:364. Britt. and Br. Ill. Fl. 1:242. **C. Michauxianus,** Schultes. Mant. 2:123. Watson Bot. Cal. 2:215.

Culms 1-5dm. tall; leaves rough-margined, 4-6mm. wide, not exceeding the culms, those of the involucre longer than the rays; umbel usually crowded, compound, the rays few and short, not greatly unequal; spikelets narrowly linear, 5cm. long, in an oblong spike; scales ovate, subacute, 2mm. long, pale or greenish, with brown margins; achenes pale, oblong-ovoid, half the length of the scale.

Temescal; Nevin. Los Angeles River; 578 Braunton, Davidson. New England to Florida, west to Nebraska, Texas and Southern California.

9. **Cyperus longispicatus,** Norton., Trans. St. Louis Acad. 12:37. t.5. Small. Fl. S. E. U. S. 1321. **C. ferox,** Watson. Bot. Cal. 2:216, not Vahl.

Culms 3-5dm. tall; leaves 1-1.5cm. wide, strongly channeled, rough on the edges, shorter than the culms, those of the involucre 4-6, as long as the rays, or longer; umbel compound, loose and spreading, as are the short spikes, the primary rays 6-10, 3-8cm. long, or the umbel condensed or pseudocapitate; spikelets

C COLGAN del.

Cyperus longispicatus, Norton

PLATE IV

linear, 1-1.5cm long, 6-8-flowered; fertile scales oblong, 3mm. long, obtuse, stramineous, the midvein green, folded, but at maturity only concave; achenes oblong 1-1.25mm. long, 1mm. thick, very obtusely 3-angled, the obtuse apex mucronulate.

Growing in wet sand along streams; probably common in the cismontane region, below 1,000 feet altitude, but my only specimens are of my own collecting at San Bernardino, where it is abundant, and at Elsinore Lake. Dr. Britton has obliged me with a part of Norton's type specimen, 1248 B. F. Bush, from San Antonio, Texas. The spikelets are 2.5cm. long, but otherwise the plants do not differ from my own. Immature achenes are acutely 3-angled, and acute at both ends, but when fully mature they are as described.

PLATE IV. From a plant collected at Elsinore Lake. X ½ – a. Achene X 15 – b. Scale X 8.

The Bees of Southern California. III.

BY T. D. A. COCKERELL.

The following table is intended to separate the males of the common type of **Anthidium** represented by **A. maculosum, mormonum, montivagum, cognatum, &c.**, in various parts of the United States. In addition to the species of Southern California, I have included some others for comparison, two (from Pecos, New Mexico) being new. There are also included some species of a type not yet found in our region, one of them **(toltecum)** being a **Dianthidium**. I have a residue of females from Southern California which I have not cared to describe, as it seems best to describe the species, so far as possible, from the males, which possess the strongest characters. No doubt further investigation will show that some of the undescribed females belong with described males, and when this is not the case, the males may be discovered, permitting a more exact definition of the characters of the species. It is to be understood that all the new forms are black bees ornamented with yellow, the abdomen having notched or divided bands, the notches always anterior except on the first segment, where they are posterior.

Anthidium; Males.

Last abdominal segment deeply notched, without a median projection 1
Last abdominal segment, with a median projection...... 2
1. Margin of sixth segment sinuate (Mexico)..**toltecum, Cress**
Margin of sixth segment with a strong median tooth, and also lateral teeth (Europe).......**oblongatum, Latr.**

2. Lateral lobes of last segment spine-like, pointed........ 3
   Lateral lobes of last segment broadened............... 5
3. Lateral lobes strongly curved; mesothorax with yellow marginal marks (Europe)..............**manicatum**, L.
   Lateral lobes straight; mesothorax all black............ 4
4. Size large; clypeus with two black spots on upper part; anterior tarsi largely light yellow in front (So. Calif.) ....**banningense**, n. sp.
   Size smaller; clypeus all yellow; anterior tarsi black in front. (Pecos, N. M.)................**lupinellum**, n. sp.
5. Light markings of abdomen confined to sides; size large (Europe) ....**laterale**, Latr.
   Light markings of abdomen not confined to sides....... 6
6. Last segment of abdomen ferruginous................. 7
   Last segment of abdomen not ferruginous.............. 8
7. Yellow of abdomen very bright; the bands continuous in the middle on third and following segments (So. Calif.) ....**tricuspidum**, Prov.
   Yellow of abdomen pale; none of the bands continuous in the middle; venter of abdomen red (New Mexico) ....**porterae**, Ckll.
8. Lateral lobes of last segment entirely black, divergent and strongly curved inwards at the end; none of the abdominal bands united in the middle (Calif.)..... ....**californicum**, Cress.
   Lateral lobes not so; when entirely black, insect smaller. 9
9. Tegulae yellow and black, or rarely yellow and reddish..10
   Tegulae entirely apricot-color (So. Calif)..**palmarum**, n. sp.
10. Mesothorax entirely black; last abdominal segment entirely black, or with small yellow spots; a small yellow spot above each eye............................11
    Mesothorax with some yellow on margins; last abdominal segment with conspicuous yellow markings, or nearly all yellow 14
11. Lateral lobes of apical segment short and very broad, of the general type of **A. jocosum**; average size of insect smaller (So. Calif.)............**palliventre**, Cress.
    Lateral lobes of apical segment elongated, of the general type of **A. cognatum**; average size of insect larger.12
12. Markings of abdomen orange; abdomen shining, with sparse punctures (So. Calif.)...........**saxorum**, n. sp.
    Markings of abdomen yellow; abdomen more closely punctured 13
13. Tibiae with broad yellow stripes (So. Calif.)........ ....**collectum**, Huard.

Tibiae without such stripes (Fort Collins, Colo.).....
.................(**emarginatum**, Say, var?) TITUSI. nov.

14. Femora with conspicuous red patches; flagellum red beneath; hair of head and thorax all white (New Mexico).............................. **paroselae, Ckll.**
    Femora without red patches; flagellum all black........15
15. Hair of thoracic dorsum white: size small.............16
    Hair of thoracic dorsum fulvus or ochraceous..........17
16. Scape all black (So. Calif.)..**bernardinum** var. **fragariellum**
    Scape yellow in front (So. Calif.).**bernardinum** var. **aridum**
17. Markings of abdomen lemon-yellow (Pecos, N. M.)..
    ....**pecosense**, n. sp.
    Markings of abdomen orange.........................18
18. Size small, about 11 mm. long (So. Calif.)...........
    ....**bernardinum**, var. **wilsoni**
    Size larger, about 14 mm. long (So. Calif.)...........
    ....**bernardinum**, n sp.

Anthidium banningense, n. sp.

Male: Length, $14\frac{1}{2}$ mm.; black, the markings rather pale yellow, pubescence white, abundant on upper part of head and thorax. Clypeus, lateral face-marks, mandibles except apex, and oblong marks above tops of eyes, pale yellow; clypeus with two black marks near its upper margin; anterior margin of clypeus without notches or protuberances; mandibles with the apical tooth broad, pointed, falciform, but the others hardly developed, the second only a distinct nodule; antennae entirely black; thorax entirely black, only the tegulae with a pale yellow patch; wings only moderately stained with brown; first recurrent nervure joining second submarginal cell some distance from its base; basal nervure passing considerably basad of transverso-medial; legs robust, black, anterior tibiae with a small yellow spot near apex, middle tibiae with a large apical mark, basal joint of tarsi light yellow on the outer side; abdomen with the band on first segment divided into spots (the middle pair small), the others nearly (or quite) divided, the second interrupted in the middle line, the third to fifth only emarginate, sixth segment with two yellow marks, apical all black; segments much more closely and regularly punctured behind the bands than before them; sixth segment with large lateral curved black teeth; lateral processes of apical segment straight or almost so, narrow and pointed; ventral surface of abdomen dark reddish.

Hab.—Banning, Calif., 1892. One taken by Dr. Davidson.

Anthidium lupinellum, n. sp.

Male; length about 11 mm.; a rather small, compact species,

with all the abdominal bands divided into spots as in **A. maculosum**; pubescence white, some blackish on scutellum, and vertex, and especially just behind ocelli; clypeus bright lemon yellow, not spotted, not at all obscured by hair, its narrow lower edge black; lateral face-marks, mandibles except apex, and small spot above each eye, yellow; first and second mandibular teeth broad and sharply pointed; antennae entirely black; thorax all black except two small yellow marks on scutellum; tegulae with a large yellow spot in front and a small one behind; wings not very dark; legs black, with the basal joints of the middle and hind tarsi cream-color (but basal joint of anterior tarsus is black); abdominal segments with thin marginal fringes of black hair; sixth segment with four spots like the others, seventh all black; lateral apical processes long and narrow; venter of abdomen black.

Hab.—Pecos, New Mexico, at flowers of **Lupinus** near Harrison's store, June 30, 1903, collected by W. P. Cockerell. By the structure of the last two dorsal abdominal segments, this is closely related to **A. banningense**; but it is smaller and differs in several particulars.

Anthidium tricuspidum, Provancher.

Los Angeles, Calif., three collected by Dr. Davidson. Provancher's description is incomplete, but as his material was from the same locality, and the rather peculiar bright yellow pattern of the abdomen agrees, I assume that I have the insect he described. The ventral surface of the abdomen is light ferruginous.

Anthidium californicum, Cresson.

Los Angeles, Calif., five collected by Dr. Davidson. In these specimens the hair on vertex and thorax above is white, not dull yellow. I have not seen authentic material of **A. californicum,** but the Los Angeles insect fits the description so nearly that I assume it to be the same.

Anthidium palmarum, n. sp.

Male; length about 9 mm.; pubescence white, dense on face, covering clypeus; clypeus and very small lateral face-marks (separated from orbital margin), mandibles except tips, and small spots above eyes, light yellow; mandibles with first and second teeth acute; antennae entirely black; thorax all black except an interrupted yellow line on scutellum; tegulae a warm red; wings rather clear; legs black, marked with light yellow and ferruginous, the lighter colors including the knees, stripes on anterior and middle tibiae, and spots at base and apex of hind tibiae, the last also being reddish behind; basal joint of tarsi yellow, the other joint light

ferruginous; the tibial ornamentation really consists of basal and apical yellow spots jointed by a red stripe, the stripe being absent on the hind tibiae; abdominal markings shining, orange-yellow, the band on the first segment divided into four spots, on the second almost divided, on the others successively somewhat less so, but all divided in the middle; sixth segment with two very large yellow marks; lateral apical lobes marked with yellow, moderately broad; ventral surface of abdomen black, except sides of first segment, which are ferruginous.

Hab.—Two collected by Dr. Davidson; the type from Palm Spring; the other (reddened by cyanide), Los Angeles. Easily known by the apricot-colored tegulae, the orange-yellow markings of abdomen, &c. The end of the abdomen is constructed in the manner of **A. cognatum,** but the lateral lobes are a little broader and somewhat divergent, and the lateral spines of the sixth segment are practically straight.

Anthidium palliventre, Cresson.

With some hesitation I refer here four males, one from Logan, Utah (L. Bruner, No. 17), the other three collected by Dr. Davidson in California, at Los Angeles, Tehachapi and Bear Valley. **A. palliventre** was described from a female collected in California, and females of this group have few distinctive characters. A female collected by Dr. Davidson at Los Angeles seems to be **palliventre,** but the ventral scopa is blackish in the middle and white laterally. It has the face entirely black.

Catalogue of Indian Relics on Santa Catalina, etc. Cont.

BY MRS. M. BURTON WILLIAMSON

No.

13,126. Bone Dagger.
13,127. Fragment of handle to 13,126.
13,128. Bone implement with hole.
13,129. Bone needles—3.
13,130. Bone needle, long.
13,131. Bone Awls, small—4.
13,132. Vertebra of fish.
13,133. Fragments of baskets.
13,134. Fragments of baskets, wound.
13,135. Strings, one wound in ball.
13,136. Fragments of cloth.
13,137. Red paint, powdered and in lumps.
13,138. Red paint, in worked shapes—5.
13,139. Black paint, powdered.
13,140. Shells with paint in them.

13,141. Fish vertebrae, paint in them.
13,142. Small stones for grinding paint.
13,143. Small steatite pot, ornamented with lines.
13,144-46. Small pot, steatite, plain.
13,147. Small ladle, steatite (toy).
13,148. Pipe of steatite, bone mouth piece.
13,149. Stone pipe, with bone mouth piece.
13,150. Stone pipe ,broken, with bone mouth piece—2.
13,151. Stone pipe, without mouth piece.
13,152. Fragments stone rings—2.
13,153. Perforated stone ornaments—5.
13,154. Stone ornament.
13,155. Perforated stone, weight for digging.
13,156. Perforated stones, weights, for digging—6.
13,157. Stone beads—3.
13,158. Stone implements—2.
13,159-64. Comali for cooking tortillas.
13,165. Comali, with 3 holes.
13,166. Comali, with band.
13,167. Comali, with lines.
13,168. Stone implement, grinding shells?
13,169. Stone pestle.
13,170. Stone implement.
13,171. F. dagger.
13,172. Spearpoint, triangular, obsidian.
13,173. Arrowhead.
13,174. Spearpoint, obsidian, leaf-shaped.
13,175-78. Shell beads—2.
13,179. Shells. Abalone—3.
13,180-84. Shell ornaments, broken—3.
13,185. Shell fishhooks, different stages of manufacture—11.
13,186. Stone implements used in cutting 13,185—12.
13,187. Stone implements used in cutting 13,185, broken—6.
13,188. Hair brushes.
13,189. Copper cup, containing cloth, basket, string of beads and part of human scalp.
13,192. Copper plate, covered with cloth and containing vegetable products—seeds.
13,193. Copper cup, covered with cloth and skin.
13,194. Copper bowl, containing cloth and human hair.
13,195. Copper bowl.
13,196. Copper jar.
13,197. Implements and ornaments of copper.
13,198. Broken spoons.
13,199. Bell.
13,200. Sleigh bell.
13,201. Bell clapper, copper.

13,202. Vase.
13,203. Three fibulae tied together.
13,204. Fibulae. Buckle, copper.
13,205. Bosses, ornamented with shell.
13,206. Medals of Catholic Church—3.
13,207. Thimbles; worn as beads.
13,208. Copper implement.
13,209. Buttons, strung together.
13,210. Buttons and beads strung together.
13,211. Copper awl.
13,212. Strings of glass and shell beads.
13,213. Brass rings and beads on strings.
13,214. Glass and part of ring (for making fire).
13,215. Earthen bowl made on wheel.
13,216. China bowl, crackled ware.
13,217. Leather band.
13,218. Glass beads.
13,219. Beads.
13,220. Cigarette holder.
13,221. Iron hoe.
13,222. Iron axes—4.
13,223. Iron cannon balls—2.
13,224. Iron swords.
13,225. Iron scissors.
13,226. Iron spear point.
13,227. Iron knife blades.
13,228. Fragments gun barrels?
13,229. Iron buckles, implements, etc.
13,230. Iron bowl, small, broken.
13,231-45. Skull and bones—human.
13,246-59. Human crania.
13,260. Human Cranium and bones.
13,261. Diseased bones.
13,262. Pelvis, belonging with 13,260.
13,263. Fragment of cloth.

Cabrillo's Rancheria.

13,264. Copper band, with cloth inclosed.
13,265. Copper buckle.
13,266. Copper implements—2.
13,267. Iron ladle.
13,268. Iron implements, broken—2.
13,269. Stone ornament, perforated.

Graves, Johnson's Place, Santa Catalina, Cal.

13,270. Boat-shaped dish of steatite.
13,271. Whale of steatite. Toy.
13,272. Whale of steatite. Toy.
13,273. Perforated stone. Weight.

13,274. Sinker?
13,275. Sharpening stone.
13,276. Stone.
13,277. Stone worked.
13,278. Wooden implement.
13,279. Bone awl.
13,280. Shell fishhooks in process of manufacture.
13,281. Shell ornaments.
13,282. Shell beads.
13,283. Glass beads.
13,284. Red paint.
13,285. Bones of child.
13,286. Human skull and bones.
13,287. Human skull and bones.

Graves, Whitney's Place, Santa Catalina, Cal.

13,288. Stone arrow straightener.
13,289. Comalis for cooking tortillas.
13,290. Stone pipe.
13,291. Grooved stone.
13,292. Stone dipper.
13,293. Stone ring-weight for digging.
13,294. Stone chips.
13,295. Worked stone sinker?
13,296. Shells of abalone.
13,297. Shells of abalone, with red paint.
13,298. Cone of red paint.
13,299. Shell fishhooks in process of manufacture.
13,300. Shell ornament, sabre shaped.
13,301. Shell ornaments—8.
13,302. Bone implements.
13,303. Claws.
13,304. Shell implements.

Workshop, Frank Whitney's Place, Santa Catalina Cal.

13,305. Shell of Abalone, with seed.
13,306. Fishhooks, shell, in process of manufacture.
13,307. Shell ornaments.
13,308. Fish vertebrae.
13,309. Skull of crow.
13,310. Asphalt.

Shell Mound, F. Whitney's Place, Santa Catalina, Cal.

13,311-15. Soapstone pot, rude.
13,316. Soapstone pot, ornamented with lines.
13,317-27. Small pot of steatite.
13,328-31. Small stone pot.
13,332-34. Steatite pot, with groove on bottom.
13,335-39. Comali, with groove on bottom.
13,340-42. Perforated Comali, steatite.

(Continued in May Number.)

Transactions for March, 1904.

ASTRONOMICAL SECTION.

The meeting was presided over by Chairman W. H. Knight, who introduced the exercises of the evening by a statement of current astronomical phenomena, giving an account of the observations made at the Lick Observatory on the motions and peculiarities of Borelli's comet, laying special emphasis upon the remarkable characteristics of the several tails of the comet. Mr. Knight also read an account of the appearance and movement of three remarkable meteors observed on the Pacific by the commander of the United States Steamship Supply. The variations in the apparent motion of these meteors cannot be accounted for by any known theories of meteoric motion.

The chairman read an extract comparing all the time that is supposed to have elapsed since the earth became a solid to a day of twenty-four hours, showing by comparative subdivisions of the two periods, that the six thousand years of the recorded history of man is represented by the last five seconds of the day that stands for the aeons of the earth's existence.

Mathematics being the major topic of the evening, the chairman read some interesting extracts from famous mathematicians relative to the beauty and practical value of mathematical principles.

Mr. B. R. Baumgardt was then introduced and presented the subject of logarithms, explaining the principles upon which the system is based and the stupendous saving of time and labor due to the use of logarithms in all calculations involving large numbers and numerous or long multiplications and divisions.

Mr. Baumgardt then exemplified the principle of the conchoid curve, which gave rise to a discussion of the cycloid curve and its application to a theoretically accurate pendulum.

The meeting was concluded with the reading by Mr. Baumgardt of a graphic account of the partial solar eclipse of May, 1900, as witnessed from Mount Lowe by the members and friends of the Astronomical Section.

MELVILLE DOZIER, Secretary.

March 21, 1904.

GEOLOGICAL SECTION.

Los Angeles, Cal., March 28, 1904.

The officers of the Geological Section met at the Woman' Club Rooms, but owing to the inclemency of the weather the attendance was small and the meeting adjourned to April 25th, when the Rev. H. B. Gage, of Long Beach, will deliver a lecture on the "Minerals of Riverside County," and the secretary will exhibit specimens of the crystallization of iron and copper.

G. MAJOR TABER, Secretary.

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MELVILLE DOZIER G. W. PARSONS

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MAILED MAY 24, 1904

A Preliminary Synopsis of the Southern California Cyperaceae.

BY S. B. PARISH.

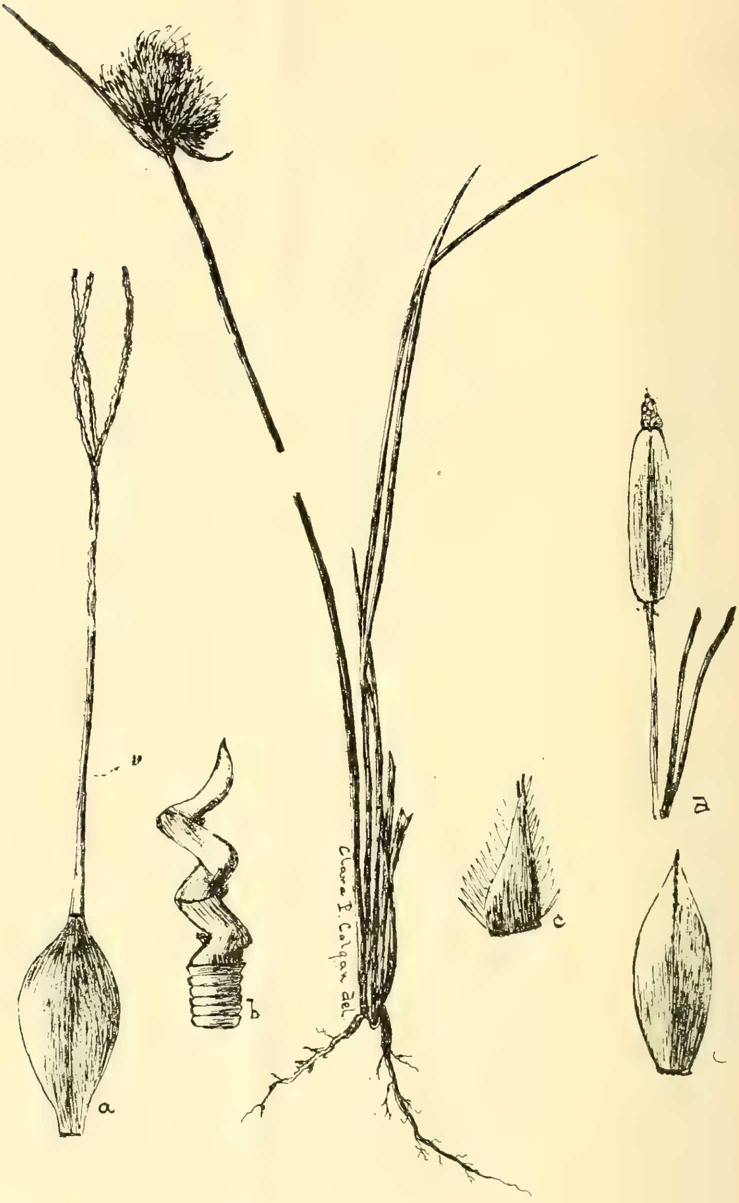
2. SCHOENUS, Linn. Gen. n. 65, in part.

Herbs, mostly perennial, varying in habit. Inflorescence capitate, or variously spicate, or paniculate. Flowers in flattened spikelets of few scales, rarely only one. Scales 2-ranked, 1-8 of the lowest empty and contiguous. Rachis of the fertile flowers prolonged and flexuous, or in the 1-flowered species produced beyond the flower, curved and bearing an empty scale. Perianth of 6, or fewer, bristles, which are often ciliate, sometimes scale-like, or wanting. Stamens 3, rarely fewer, or 4-6. Style 3-cleft, little or not at all enlarged at base, wholly deciduous from the summit of the 3-angled, or 3-ribbed achene.

A genus of some 60 species, mostly natives of Australia or New Zealand. Represented in America only by the following species, which is also European.

1. **Schoenus nigricans,** Linn. Sp. Pl. 43.

Culms erect, terete and striate, 5-6 dm. tall; leaves shorter, narrowly linear, stiff and erect, their dark purple or blackish bases enlarged and clasping; involucral leaves 2, similar, the lower erect and 6-12 cm. long, the upper very short or a little exceeding the head; spikelets numerous, aggregated in a dense head, 5-15 mm. long; the flexuous upper part of the rachis



SCHOENUS NIGRICANS, Linn.

Plate 5. Plant collected at Arrowhead Hot Springs x ¼.

a. Pistil x 10. c. Perianth Scale x 20. e. Scale x 5.
b. Rachis x 5. d. Stamens x 10

readily separating from the lower straight part; scales dark reddish brown, strongly folded, 5-8 mm. long, deciduous, the lower infertile scales 6-8, smooth and acute, the fertile 4-6, often scabrid on the keel and mucronulate, the uppermost often staminate, or empty; perianth scales 2-5, accuminate, or aristate, ciliate toothed, 0.5mm. long, persistent; anthers tipped with a conical cellular appendage; style dark, about 1 cm. long; achenes white, smooth and shining, ovoid, obtusely 3-angled, 1.5 mm. long.

Arrowhead Hot Springs, near San Bernardino, and Lone Pine Canyon, near Cajon Pass; Parish. Furnace Creek Canyon, Death Valley; Coville and Funston. The species is known in America, in addition to the above stations, only from Ash Meadows, Nevada, and from Florida. All the western plants grow in alkaline soil. Plate V.

3 ELEOCHARIS, R. Br. Prodr Fl. Nov. Holl. 1:224.

Annual or perennial herbs with tufted, angular, flattened, or terete culms. Leaves reduced to basal sheaths, the lowest rarely bearing a short blade. Flowers in solitary, erect, non-involucrate spikelets. Scales concave, scarious-margined, spirally imbricated around the rachis. Perianth of 1-12 retrorsely barbed bristles, or rarely none. Style 2-cleft and the achene lenticular, or 3-cleft and the achene 3-angled or turgid, its conical or flattened tubercular base persistent on the summit of the achene.

A genus of about 100 species, growing in wet places, from the tropics north to the Arctic regions.

Key to the Species.

Style 2-cleft; achene lenticular.
- Annual; achene black, tubercle flat. **1. E. capitata.**
- Perennial; tubercle conical. **2. E. palustris.**

Style 3-cleft, achene 3-angled or turgid.
- Achene cancellate; tubercle conical. **3. E. acicularis.**
- Achene puncticulate; tubercle disc-like **4 E. disciformis.**
- Achene smooth and shining.
  - Tubercle not continuous with the achene.
    - Tubercle broader at base than the apex of the achene; spikelet oblong. **5. E. montana.**
    - Tubercle calyptrate; spikelet lanceolate **6 E. Parishii.**
  - Tubercle continuous with achene; conical. **7 E. rostellata.**

**Styles 2-cleft and achenes lenticular; tubercle constricted at base.*

1. **Eleocharis capitata,** R. Br. Prodr. Fl. Holl. 1:225.

Annual, culms slender or filiform, terete, erect, 1-1.5 dm. tall; upper sheath 1-toothed; spikelets ovoid, obtuse 4-5 mm.

high and 3 mm. thick; scales ovate, obtuse, about 2 mm. long, brown with a green midvein; stamens 2; bristles 4-6, obscurely toothed, equalling the achene, or none; achenes broadly obovoid 0.75 mm. high, black and shining, tubercle flat and disk-like.

In wet sand San Bernardino; 1293, 5276, 5277 Parish. Palm Springs in the Colorado Desert; 1160 Parish. A species of wide distribution in tropical regions.

2. **Eleocharis palustris,** R. & S. Syst. 2:151.

Perennial by horizontal rootstocks; culms stout, terete, striate, 3-15 dm. tall; basal sheaths brown, the uppermost very obliquly truncate; spikelets ovoid-cylindrical, acute 1 cm. long; scales ovate, obtuse or subacute, purple-brown, with green midvein; stamens 2-3; bristles 4, equalling the achene, or none; achenes ovoid-oblong, 2 mm. long, yellow-brown, smooth and shining, tubercle triangular-conic, less than one-fourth as long as the achene.

Probably common in wet places in the Cismontane region, but the only specimen seen was collected by myself, at San Bernardino. Cosmopolitan.

Eleocharis palustris glaucescens, Gray, Man. ed.5, 558. Britt. & Br. Ill. Fl. 1:252.

Culms slender, 3-5 dm. tall; spikelets oblong, 5-10 mm. long, acute; upper sheaths horizontally truncate; tubercle narrower and more acute.

In swamps and ditches and along streams; probably common. Lake Surprise, 8,200 ft. alt., San Jacinto Mts.; 2489 Hall. San Bernardino Valley; 1185 Parish. Common throughout North America.

***Styles 3-cleft; stamens usually 3; plants perennial by horizontal rootstocks except n. 4.*

+ Uppermost sheaths 1-toothed, with a more or less indurated ring at the horizontally truncate summit; tubercle not continuous with the summit of the obscurely 3-angled, turgid, achene.

++ Achenes having intermediate ribs and minute transverse ridges

3. **Eleocharis acicularis,** R. & S. Syst. 2:154.

Culms tufted from filiform rootstocks, setaceous or filiform, 3-15 cm. tall; spikelet narrowly oblong, or ovate, acute, 2-3 mm. long, acute, 3-9-flowered; scales ovate-oblong, acutish, 1 mm. long, pallid or greenish; bristles 3-4, weak, exceeding the achene, often none; achenes pale, oblong-ovoid, 1 mm. long; tubercle conic, one-fourth the length of the achene.

Banks of the Santa Ana river, near San Bernardino; 1061 Parish. An immature specimen collected at Los Angeles, by Davidson, may belong here. Throughout North America.

(To be continued.)

Descriptions of Some Undescribed Fossil Shells of Pleistocene and Pliocene Formations of the Santa Monica Range.

BY PROF. J. J. RIVERS.

Dr. Ralph Arnold in his memoir of the fossils of San Pedro published in June, 1903, made no mention of the species now described. His very excellent treatise scarcely touched upon the riches of the Santa Monica Range though he almost exhausted the gifts of nature in fossil Mollusca of San Pedro together with those yielded by the rocks of San Diego and Santa Barbara.

The Santa Monica Range has the same deposits as those of San Diego, San Pedro and Santa Barbara judging from the fauna found in this range. The San Diego Pliocene is represented here by co-types of the following species:

Ostrea veatchi Gabb., Pecten expansus Dall., Pecten hastatus Sow., Pecten bellus Con., Pecten caurinus Gld., Pecten hemphilli Dall., Pecten stearnsii Dall., Pecten opuntia Dall., Pecten subventricosus Dall., Pecten ventricosus Sow., Pecten hericeus, Gld., Pecten subnodosus Dall and several other Pectens together with Opalia varicostata Stearns and Pisania fortis Carp.

The formations of Santa Barbara, San Pedro and San Diego have each yielded **Brachiopods,** but the middle **Pliocene** deposits of the Santa Monica Range have furnished all the known species found hitherto discovered in the other three localities, viz: **Terebratalia smithi** Arnold. **Terebratalia hemphilli,** Dall., **Laqueus jeffreysi** Dall., **Laqueus californicus Koch.**

Santa Monica Range furnishes a wide field of geological investigation being rich in Pliocene deposits. There appears to be three distinct Pliocene epochs; the oldest is a thick deposit with few fossils and its matrix is formed out of the first erosion of the Miocene and contains chunks of the shale uneroded and fossils not yet identified. The strata has been tilted to the perpendicular and crushed and crossbedded so that when the fossils are disturbed they do not crumble but break to pieces.

The next older strata are the representatives of the San Diego hard sandstone series yielding the Pectens. The later Pliocene is the same as represented on Deadman's Island, San Pedro. These are capped everywhere by Quaternary beach gravels and by erosion debris as well as by glacial drift. The canons of the coast yields glacial pebbles not profusely but commonly and a student in geology can identify them easily.

Hyalaea tricuspida n. sp.

Shell opaque white; dorsal plate widely convex; smooth on

the disc; a lateral spine on either side and a terminal appendage short and truncate behind; parallel to the lateral spines is a carina; on the disc of the other side are five longitudinally situated carinae; aperture sharply truncate on dorsum, but strongly rounded on the opposite plate; the slit reaching quite to the lateral spines.

Dimensions: Longitude 8 mm., latitude 7 mm.

Geology: Pleistocene of Santa Monica Range, Cal.

Eulima raymondi n. sp.

Form: Very attenuate; shell in texture as usual in this genus smooth, glossy, and white in color; whorls eleven; sutures scarcely impressed; strongly oblique; the three last whorls equal to the remainder; aperture 2.2 mm. long and 1 mm. wide. Longitude 11 mm., latitude 2 mm.

Not known to be living.

Geology: Pleistocene Santa Monica Range, Cal.

This cannot be confounded with any of the described species belonging to this coast it being much more attenuated in form comparing length with width, the mouth more produced forward and elongated and narrowed behind. Eleven specimens have been secured and are true to form and proportions.

Chrysodomus arnoldi n. sp.

Shell thick, robust, chalk white; elegantly, fusiform; spire about one-fifth of the whole; spire compressed; whorls about five; nucleus and following whorl missing; the third and fourth whorls are sculptured with rather wide transverse ridges; but the fifth whorl the ridges are nearly obsolete; sutures roughly encrusted; body whorl strongly shouldered but not tabled; the sculpture consists of five woolving, flattened strive or ridges crossed at intervals by strong incremental lines which perhaps in an unworn example might show varices; in the fossil there appears faintly a cancellate pattern; all the whorls bear an alternate series of fine revolving ridges which on the body whorl gages two to a mm.; columnella medium, twisted; channel open but shallow; incrusted thickly interiverity; aperture pyriform umbilicus subperforate as in **Pisania fortis** Carpt.

Dimensions: Long 40 mm.; lat. 20 mm.

Geological formation, Pliocene. One specimen.

Locality: Crawfish Gorge's; San Pedro, Cal.

Chrysodomus merriami n. sp.

Shell bucciniform; whorls eight; nucleus eroded; incremental and fine lines appear as soon as growth begins which increase in regular ratio until the body whorl show ridges and appressed lines that gage six to a mm. Apex not de-

pressed as it gages 20 mm.; the whorls are strongly rounded; sutures deeply impressed; bodywhorl 25 mm. long, much inflated; outer lip not thickened but has a bulging inflation turning inwards; the edge being entire. The columnella being hid in the matrix but from several fragmentary examples; the columnella is short, twisted; channel wide; aperture very wide.

This shell was found in the same deposit as **C. aphelus** Dall and C. **griseus** Dall.

Geological formation: Pliocenl; Santa Monica Range.

Chrysodomus aphelus Dall.

The U. S. Report on Albatross Mollusca Pro. U. S. Nat. Mus. Vol. XII pages 219-362, gives descriptions by Dr. Healy Dall of various living Mollusks dredged from near Santa Barbara, Cal.

An examination of the Pliocene strata of the Santa Monica Range has brought to light two of Dr. Dalls species and a third one in the same deposit that the dredge of the Albatross did not discover.

"The living shells, (according to the Albatross Reports) occur in 414 fathoms grey sand." The fossils occur in a silty formation in which remains of marine and terrestrial flora abound. The elevation from sea level of these strata varies from a few feet up to seventy or a hundred feet above. The height or depth of these strata carries no geological value but it is their position and what they contain that yield their natural worth; these strata dip strongly to the southwest at various angles and in places tilted to the perpendicular. These fossils therefore may have enjoyed at one time a depth of 414 fathoms, particularly so as the deposits dip under a hundred feet of nearly horizontal Pleistocene.

Chrysodomus aphelus Dall. (Albatross Mollusca Pl. VI. fig. 7.)

Shell bucciniform; six whorled, smooth; nucleus eroded; whorls full, well rounded; sutures distinct and somewhat deep; sculptum of faint incremental lines which curve to the swelling of the whorls; obscure spiral traces; outer lip thin, smooth, polished white, on the inside, which is reflected rather strongly at the upper angle but diminishes gradually towards the channel; columnella short, not calloused, throat smooth white; pillar very obliquely truncate.

Dimensions: Report gives maximum longitude 32 mm.; maximum latitude 18 mm.; but the fossils give increased dimensions; the maximum being 40 mm. to 20 respectively. The majority of the fossil forms are however much below these measurements.

Chrysodomus griseus Dall.

This is another of the "Albatross Mollusca" and Dr. Dall's description can easily be followed with the shell before me.

Shell thin, rather acutely pointed when perfect;" seven or eight whorled; the substratum, pillar, throat milk white and smooth; nucleus eroded, small round; suture distinct; whorls full and rounded; **transverse sculpture twenty or more arcuated wave-like ribs,** which on the earlier whorls often reach from suture to suture but are strongest on the periphery. As the shells do not hold to the same relative proportions of latitude and longitude, the more elongate the specimen the fainter is the sculpture.

Found in company with **B. aphelus** Dall in the Pliocene of Santa Monica Range, Los Angeles Co., Cal.

One specimen perfect, two nearly so and several more or less fragmental.

The Bees of Southern California. IV.

BY T. D. A. COCKERELL.

Anthidium saxorum, n. sp.

Male; length about 11 mm.; pubescence white, faintly tinged with ochreous dorsally, abundant on head and thorax, but not concealing clypeus; clypeus, lateral face-marks, mandibles except tips, stripe on scape, and small spot above each eye, pale chrome yellow; mandibles with only one large tooth; flagellum black; thorax all black except tubercles and two marks on scutellum, which are yellow; tegulae with a large yellow spot in front, and a small one behind; wings fairly clear; femora black, with a small apical yellow spot on the middle and hind ones; tibiae with a broad yellow stripe on the outer side, which sends a process to the anterior side apically; basal joint of tarsi yellow; abdomen unusually smooth and shining, the bands deep orange; band on first segment broken into four spots, those in the middle small and transversely elongated; bands on second to fifth emarginate medially and laterally, but not broken; sixth nearly all orange; seventh with only two yellow spots; lateral apical lobes broad and not much produced, very much as in **A. mormonum,** except that they are less curved inward; venter reddish-black.

Hab.—Rock Creek, California, one collected by Dr. Davidson. By the cariniform tubercles, white pubesence, etc., this resembles **A. mormonum,** but it differs by having no basal spots on scutellum, bands on abdomen not interrupted medially, &c.

Anthidium collectum, Huard:

Four males obtained by Dr. Davidson are referred here; two from Los Angeles, one from Tehachapi, one from Switzer's. According to the original description, **collectum** Huard (**compactum,** Provancher) differs from **tricuspidum** in being smaller, having no marks on thorax, and the first three segments of abdomen with the bands divided into spots. The last character is somewhat variable. The species appears to be very near to **A. emarginatum,** Say, but that has the abdominal bands yellowish-white or white. The specimen from Tehachapi represents a distinct variety, perhaps species, which may be described thus:

A. collectum var. **ultrapictum,** nov.

A little larger; scape with a yellow stripe; abdominal bands very bright yellow, only that on first segment divided into four spots, the others not even divided in the middle, though emarginate there and squarely notched laterally; sixth segment with two very large round yellow marks, touching in the middle line; seventh all black, with the lateral lobes not so produced as in **collectum,** and distinctly angled on the outer side; tibiae with more yellow. The dorsal pubescence has just a faint ochreous tint. There are no sub-apical ventral spines.

Anthidium (emarginatum, Say var?) **Titusi,** nov.

Easily distinguished from typical **emarginatum** (male) by the bright lemon-yellow (instead of yellowish-white or white) abominal bands, and the tibiae all black except a minute basal spot, and an apical one on middle tibia. Clypeus with two black dots near upper border; antennae entirely black; dorsal pubescence dull white; thorax all black except two short lines on scutellum; anterior part of tegulae yellow; wings dusky; basal joint of tarsi light yellow, the other joint ferruginous; first abdominal segment with very long hair, its band divided into four spots, the middle ones transversely elongated; bands on the second and third greatly narrowed mesad of the notch, and slightly divided in the middle; on fourth and fifth widely notched, but only emarginate in the middle; sixth segment with two very large comma-shaped yellow marks; seventh all black, formed about as in **ultrapictum,** but the lateral lobes not quite so produced; venter black; apex of venter strongly tridentate, with a large median ferruginous process directed caudad, and large black lateral spines directed more downwards.

Hab.—Fort Collins, Colorado, June 13, 1900. (E. S. G. Titus.) The apical ventral structures recall **A. montivagum.**

Anthidium pecosense, n. sp.

Male; length about 11 mm., stout and compact; pubescence white on pleura, cheeks and face below antennae, but fulvous on upper part of head and thorax; hair quite dense over clypeus; clypeus, lateral face-marks, mandibles except tips, and small spots above eyes, lemon yellow; clypeus with two dusky dots near its upper margin; mandibles comparatively narrow, second tooth small but pointed; antennae entirely black; thorax black with the tubercles, a bent stripe on antero-lateral corner of mesothorax, and two lines on scutellum, yellow; tegulae black with a large pale yellow mark; wings dusky; femora black, with more or less of a yellow stripe beneath (best developed on the anterior ones, but obscured by hair), and the middle and posterior ones with very small apical (knee) spots; tibiae broadly yellow on the outer side; basal joint of tarsi yellow, the other joints ferruginous; abdomen with the bands bright lemon-yellow, that on the first divided into four spots, the median spots subquadrate; band on second divided in the middle and squarely notched laterally, on third divided in middle and with small lateral notches, on fourth and fifth emarginate only in the middle, and not notched laterally; sixth almost all yellow, but emarginate with black in middle; apical segment with two yellow spots; lateral apical lobes broad, median process long, lateral teeth on sixth segment rather short; venter black.

Hab.—Pecos, New Mexico, one at flowers of **Heracleum lanatum,** June 21, 1903. (Cockerell). The apex of the abdomen is of the same type as **A. mormonum,** from which it is easily distinguished by the fulvous hair of head and thorax. From **A. poudreum,** Titus (misprinted **pondreum** in original description). **A. pecosense** differs by having the ventral segments of abdomen thickly pubescent right across, femora and tibiae with white hair, dorsum of thorax with abundant fulvous hair, no dots before the lines on scutellum, all the femora with yellow stripes, band on first abdominal segment broken into spots.

Anthidium bernardinum, n. sp.

Male; length about 13 mm., general appearance of **A. tricuspidum,** but differing in many details, and especially in the apex of the abdomen, the lobes of which are much shorter, broader and more rounded, and yellow with dark brown margins, the median spine also being dark brown. The real affinity of the insect is with **A. pecosense,** but it is larger, and very different in its deep orange markings;

the dorsal pubescence of the head and thorax, as in **pecosense,** is fulvous. Head marked as in **pecosense,** except that the scape has a yellow stripe (sometimes wanting) and the spots above the eyes are produced and pointed mesad; thorax with the yellow markings of **pecosense** replaced by orange and more developed, forming a broad band surrounding the mesthorax and scutellum, except for a space in front; band on first abdominal segment notched behind, or sometimes divided into four spots, in which case the median spots are quadrate and qute large; remaining bands laterally notched (not very broadly) in front, and emarginate in the middle, those on the second, third and sixth frequently divided; lateral spines of sixth segment partly yellow; venter of abdomen ferruginous, with yellow spots at extreme sides; apical ventral segment tridentate, the middle tooth broad, ferruginous, and emarginate, the lateral ones rather broad and not very long, ferruginous edged with black. The femora have broad orange stripes, the tibiae are entirely orange on the outer side; basal joint of tarsi orange, the others ferruginous.

Hab.—Five males collected by Dr. Davidson; type from Strawberry Valley, others from Mt. Wilson. With these I associate some females from Bear Valley, Wilson's Peak and Los Angeles. They are similar to the male, but smaller (10½ mm. lon|g), the clypeus has a blackish median shade, the spots above the eyes are produced into bands which nearly meet in the middle line, and the ventral scopa is white. The female suggests **A. placitum,** but the abdomen is strongly punctured, and not transversely impressed at base.

The following three forms are referred as varieties to **A. bernardinum,** but they certainly look very different, though similar in the details of the markings, &c.

A. bernardinum v. wilsoni, n. v.

Male; length about 10½ mm.; dorsal pubescence pale fulvous; antennae entirely black; band on fourth abdominal segment divided in middle, as well as those on second and third; apical lobes with the inner angle more prominent; yellow on thorax reduced to two lines on mesothorax in front, line on tubercles, and two lines and two dots on scutellum; venter of abdomen very dark brown; apical ventral segment with the median process large, broadly rounded, dark brown, not emarginate, the lateral ones pointed black teeth; femora brown-black, the middle ones with a yellow apical spot, the hind ones with an apical stripe.

Hab.—Mt. Wilson, California, one collected by Dr. Davidson.

Anthidium bernardinum v. **fragariellum,** n. v.

Male; length $9\frac{1}{2}$ mm.; dorsal pubescence white; antennae entirely black; spots above eyes oval, not pointed mesad; marginal yellow of mesothorax and scutellum rather well developed; wings decidedly reddish; middle and anterior femora with broad yellow stripes beneath, hind femora with the apical half striped above and beneath, middle femora with a yellow apical patch above, but anterior femora all black above; apical lobes of abdomen more curved inwards than in **bernardinum**; venter of abdomen brown black; last ventral segment with median process ferruginous, broad and subtruncate, not emarginate, the lateral processes pointed black spines.

Hab.—Strawberry Valley, California, collected by Dr. Davidson. A female from the same place appears to belong here; it has two cuneiform black marks on the clypeus; femora black, the anterior and middle ones with a yellow apical mark behind; scopa white. It is of the same size as the male.

Anthidium bernardinum v. **aridum,** n. v.

Male; like v. **fragariellum,** but a little larger; scape yellow in front; face less hairy; axillar spots absent; only the first abdominal band interrupted in the middle (the second and third are interrupted in **fragariellum**); yellow stripe on middle femora not extending beyond apical half; lateral apical lobes of abdomen more triangular, less rounded; venter black.

Hab.—Rock Creek, California, collected by Dr. Davidson.

I rather expect that when more is known about these insects **wilsoni** and **fragariellum** will stand as valid species, and **aridum** as a variation of the latter.

Flora of San Clemente Island.

BY BLANCHE TRASK.

I.

For many years San Clemente has lifted its amethystine heights, as I have followed the trails of Santa Catalina Island; a day's trip to the "West End" and a week's camping at the "East End," with a long tramp over the crest-line, made me doubt the common assertion that "San Clemente is only a treeless waste of sand."

Visits to the more northern of the Channel Islands—Santa Cruz, Santa Rosa, San Miguel and the little Anacapas—claimed my attention; and a three months' sojourn at San Nicolas

Island, at three different seasons with a tarrying at tiny Santa Barbara Island and one special trip there, absorbed all my leisure; while the heights of San Clemente ever upheld their deeps, unknown to me! So near—and yet I knew them not!

However, last year, after living there three months, I have a real satisfaction in thinking I know something of that Island. When I left I felt I would never again care to see places so terrible; but I find my heart following my eyes from the dear old Catalina trails as I see San Clemente this winter lying in all its amethystine beauty, like an Indian arrow-head, tipped with shining stretches of sand, enshrined by the white arms of the sea.

Eighteen miles long and nearly 2000 feet elevation upon its greatest height, it is by far the most inaccessible of all the Channel Islands.

A rolling upland strewn with jagged volcanic rocks, which cut the boots at every step, reaches its greatest altitude on the north coast—a coast gashed by precipitous and bold gorges, not one of which could properly be called a canyon.

The south coast rises from the sea with perpendicular walls fifty to three hundred feet high, where it surprises you by a flat which may be followed the entire length of the south coast, over a trail the worst of all the trails which I have followed in many thousand miles' tramping on these Channel Islands in the last ten years. It winds and turns and breaks into "cuts" and never a moment is the foot on level ground, but constantly caught in the crevices of the gnawing lava rocks, while a glimmering heat waves under the eaves of the heights, from whence great arroyos leap to the river flat below, casting rivers of fresh rock upon the already over-burdened rim; between these arroyos terraces rise in endless succession.

You walk there in October and November and the aridity is oppressive; but in May the same trail is a miracle of color. Eschscholtzia ramosa starring the way, while Gilia Nevinii, whose heart is the true turquoise, so that I called it "The Turquoise Daisy," is so plentiful that the arms could be filled with it. Senecio Lyoni is nearly as common as everywhere, one to three feet tall.

The sweet "Lava Daisy"—Malcothrix foliosa Greene—is here in its own home and special joy of existence. You marvel that it can draw its life from rocks which are hot to the hand and which even burn the feet in walking.

On the north coast from the highest line the gorges leap into the sea below, five hundred to two thousand feet, so suddenly, and often so unexpectedly, that no man can follow such ways in safety; there are rims of beaches below which can be

looked into directly from the greatest heights; at high tide, they are well-nigh covered with surf, for much of the time either a north or a west or a "nor-west wind" is sweeping wildly down the whole length of the island, stirring the waves to a foam without warning.

At the east end are long stretches of sandy beaches and low outlying points; at the west end are some two miles of dunes and the principal Indian rancherias.

There are two springs of water on the north coast and two on the south coast of San Clemente. At "Gallagher's"—the west end—an old ranch-house is situated where rain water is caught in tanks for all purposes. There is an artesian well at the east end; at the middle of the south coast is a pumping plant for a brackish spring. Two shepherds are regularly retained upon the island by the San Clemente Wool Company, who have leased this land from the United States Government.

I am indebted to the courtesy of the San Clemente Wool Company for granting me a pass to all parts of the island, with camping privileges; and I pledged myself that not a sheep should suffer through my hand or that of my people.

(Continued in June Number).

PUBLICATIONS RECEIVED.

"Notes on the Angora Goat." Bulletin No. 98. Maine Agricult. Exper. Station.

"Studies on the Ecology, Morphology and Speciology of the Young of Some Enteropneusta of Western North America," by Wm. E. Ritter and B. M. Davis. No. 5, Vol. 1. Zoology. University of California Publications.

"Adulterated Drugs and Chemicals." U. S. Dept. Agricult. Bureau of Chemistry. Bulletin No. 80.

"Contributions from the Gray Herbarium," by B. L. Robinson. No. 27.

"The Pliocene and Quaternary Canidae of the Great Valley of California," by J. C. Merriam. University of Cal. Geology Dept. Vol. 3, No. 14.

"A Revision of American Siphonaptera, or Fleas, together with a complete list and Bibliography of the Group," by Carl F. Baker. U. S. National Museum. No. 1361.

"Muhlenbergia," Vol. 1, No. 4.

"Experiment Station" Record No. 6. Vol. 15 U. S. Dept. Agricult.

"Thirty-fourth Annual Report of the Entomological Society of Ontario, 1-03." Ontario Dept. Agricult.

"Desert Botanical Laboratory of the Carnegie Institute." Carnegie Institution, Washington.

RECENT PUBLICATIONS.

The Missouri Botanical Garden has recently distributed an elaborate Synopsis of the Genus Lonicera, by Alfred Rehder. The number of species recognized is 157, and, in addition, a large number of varieties,

forms and hybrids are noticed. The genus has its largest development in Central and Eastern Asia. The North American continent has but twenty species, and Europe but eighteen. The species and varieties of our own region, as recognized by the author, may be recognized by the following key:

Leaves all distinct, petioled, never stipulate; corollas yellow, pubescent.
  Leaves grayish tomentose beneath. **L. subspicata.**
  Leaves glabrous. **L. subspicata denudata.**
At least the uppermost pair of leaves connate.
  Leaves never stipulate; corollas yellow, glabrous. **L. interrupta.**
  Middle leaves stipulate; corolla pink.
  Flower whorls few, slender peduncled. **L. hispidula.**
  Whorls many, in elongated spikes. **L. hispidula Californica.**

The first of these plants is common throughout the cismontane region, but its variety is confined to the coastal sub-region. **L. interrupta** is a more northern species, but has been collected at Acton by Hasse. **L. hispidula** is also more northern in its range, and its variety is apparently confined in our region, to Santa Catalina Island. S. B. P.

Among "Publications Received" our readers will note two original works by local scientists. Prof. B. M. Davis in conjunction with Prof. Ritter has issued a volume of "Studies on the Ecology, &c., of the Enteropneusta," while Prof. C. F. Baker, of Pomona, has, through the U. S. National Museum, issued a valuable work on the Fleas of America.

It is with extreme pleasure we welcome the "Flora of Los Angeles and Vicinity." Its author, Mr. Le Roy Abrams, of Stanford University, has in recent years personally examined the flora of this district and the fruit of his labors are embodied in the handsome volume before us. The nomenclature and arrangement are in accordance with the latest methods; the typographical work is very good.

The description of the species are accurate and original, many new records have been added to the district and not a few new species.

This flora will satisfy all the requirements of the ordinary botanical student in Southern California, while for those of Los Angeles and Orange Counties it will be the standard text-book for many years to come. In our educational institutions this work is indispensable. We heartily recommend the work. Price $2.00 from local publishers.

Transactions for April, 1904.

ASTRONOMICAL SECTION.

At the regular monthly meeting of the Section, held April 18th, 1904, Chairman Knight introduced the exercises with an interesting exhibit of relative distances of planets from the sun as compared to the relative distances of some of the leading stars from their companion stars, showing that the distances that separate the companions of Procyon, Sirius, Alpha Centauri and Castor from their respective principals do not exceed the distance between the sun and our most distant planet Neptune.

Mr. Knight also referred to the apparently remarkable rapidity of revolutionary motion of some of the binary stars as indicated by the rapid succession of a certain variation in the luminosity.

Mr. Melville Dozier then presented the subject of the trisection of an angle, developing a method by which this can be accomplished without resorting to higher mathematics. The method is also equally applicable to the division of an angle into any number of equal parts and to the division of a circumference into any number of equal arcs.

MELVILLE DOZIER, Secretary.

GEOLOGICAL SECTION.

Professor Theodore B. Comstock, the president, presided in the absence of G. W. Parsons, the chairman of the Section. G. Major Taber, secretary of the Section, read a paper on "Mineral Formation and Crystalization" as follows:

Mineral crystals vary from those microscopic size to several feet in length. They are either opaque or transparent, and assume almost every conceivable angle, and I note that in all the mineral kingdom there are over 700 different classifications.

Deposits of beryl, apatelite, copper and many other minerals have been found weighing several tons. The same mineral in different localities exhibits an endless variety of forms, yet their angles are always the same under like conditions.

It has been discovered that all crystals found in nature may be referred to six systems, based on certain relations to their axis.

The same substance often has wide variations. In carbon, for instance, the diamond is pure carbon; transparent, usually colorless, brittle and extremely hard. Graphite, being principally carbon, is opaque, black, tough and soft, and charcoal is very similar.

The law of crystalization should produce perfectly similar forms of the same substance, but disturbing elements and influences produce many radical changes.

Following the paper, Mr. Taber exhibited several specimens of minerals and petrified woods, after which Professor Comstock dwelt at length on the formation and crystalization of various minerals. A general discussion followed.

BIOLOGICAL SECTION.

Los Angeles, Cal., Chamber of Commerce. April 11th. 1904.

The meeting of the Biological Section was called to order by the Chairman.

The minutes of the last meeting were read and approved.

Mr. Wm. H. Knight made an interesting report on the so-called Weather Plant, Abrus precatorius. He also presented a number of the seeds to the Section.

Mr. Ulrey reported on some work which had been done tending to show that the germination of seeds was brought about by definite bacteria.

Mr. Whiting commented somewhat caustically on the action of a surgeon in the city who was reported to have operated on a woman for a frog which she claimed had been in her stomach for a year or more.

The lecture of the evening was delivered by Prof. B. M. Davis, his subject being the structure of the Larval Balanoglossus. The lecture was illustrated by a number of carefully prepared drawings. One interesting feature emphasized by the lecturer was that it is in this form of life that muscles are first found, springing from the central axis. In this and many other representations, the Balanaglossus appears to stand at the base of the vertebrate series of life.

The lecture was discussed at some length by Dr. Houghton. Mr. Knight announced that at the next meeting of the Astronomical Section, Professor Dozier would demonstrate his method of trisecting an angle

About thirty members and visitors were present. The Section adjourned to meet again on the second Monday in May.

C. A. WHITING, Secretary

VOL. III. JUNE, 1904 NO. 6

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION
A. DAVIDSON, C. M., M. D., Chairman
MELVILLE DOZIER G. W. PARSONS

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MAILED JULY 12, 1904

A Preliminary Synopsis of the Southern California Cyperaceae.

BY S. B. PARISH.

Eleocharis acicularis radicans, Britton Journ. N. Y. Micr. Soc. 5:105. **E. radicans**, Kunth, Enum. 2:142.

Usually taller; scales tinged with brown; tubercle more acutely conical, enlarged at base, and more evidently discontinuous with the summit of the achene.

Apparently the commoner form throughout the Cismontane region, ascending the mountains to 8,000 ft. alt. Pasadena; Braunton, Greata. San Bernardino; Parish. Tahquitz Valley, San Jacinto Mts.; Hall Bear Valley, San Bernardino Mts.; Parish. Texas to Southern California.

++ ++ *Achenes obscurely puncticulose.*

4. **Eleocharis disciformis**, n. sp.

Fibrous rooted annual; culms slender, striate, 10-15cm. tall; spikelet lanceolate, 5-10 mm. long, 10-15-flowered; scales brown, with a pale midvein, the lowest broadly ovate, the others ovate-oblong, obtuse, about 2mm. long; bristles 5, exceeding the achene, which is ovoid to obovoid, and 1 mm. long; tubercle depressed and disciform, abruptly mucronulate, less than one-fourth the length of the achene.

Eastern base of the San Jacinto Mts., on the borders of the Colorado Desert, June, 1901; 2013 H. M. Hall.

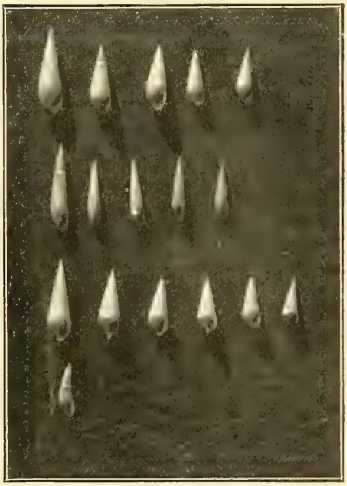
PLATE VI.

ELEOCHARIS DISCIFORMIS, (Parish).

Fossil Shells of the Santa Monica Range.

BY PROF. J. J. RIVERS.

(See Page 69.)



No. 1. EULIMA MICANS, (Carpenter).

No. 2. EULIMA RAMONDI, (Rivers).

No. 3. EULIMA HASTATA, (Sowerby).

No. 4. EULIMA FALCATA, (Carpenter).

Errata.

Line 30, page 70, ought to read: "the sculpture consists of fine revolving flattened striae.

Line 37, page 70: For "interiverity" read interiorly.

Plate VI. Plant life size, drawn from the type specimen a, mature, and b, immature achene, from the same spikelet, each X35.

++ ++ ++*Achenes smooth and shining.*

5. **Eleocharis montana,** R. & S. Syst. 2:153. Britt. Jour. N. Y. Micr. Soc. 5:109. **E. arenicola,** Torr. in Engelm. & Gray, Bost. Jour. Nat. Hist. 5:237. Watson, Bot. Cal. 2:222.

Culms clustered, from a slender dark brown rootstock, slender, striate, about 1 dm. tall; spikelet oblong, lcm. or less long; scales ovate, brown with green middle, 2 mm. long; bristles 5-6, exceeding the achene; achenes oblong-obovoid, pale, 1-1.5mm. long, the tubercle conic, broadened at base.

Rather common in the Cismontane region. Los Angeles; Davidson. Witch Creek, San Diego Co.; Alderson. San Bernardino; Parish. Mexico and north to Florida and South Carolina; on the Pacific Coast confined to Southern California.

Plate VII. Plant X2-3, a, Scale X15. b, Achene X20.

6. **Eleocharis Parishii,** Britton. Jour. N. Y. Micr. Soc. 5:110. Coville, Death Vall. Rep. 211.

Culms slender from slender rootstocks, 1-1.5 dm. tall; spikelet linear-lanceolate, acute, 1-1.5 cm. long; scales ovate to ovate-oblong, 2-2.5mm. long, obtuse, castaneous, the margins hyaline; bristles 4-5, exceeding the achene; achenes ellipsodial, pale, 1mm. long, the tubercle calyptrate, obscurely broadened at base, about one-fourth as long as the achene.

By stream banks in the Desert region. Palm Springs (Agua Caliente), 500 ft. alt., Colorado Desert, April, 1882; 1569 Parish type. West shore of Owens Lake, 3,500 ft. alt., Mojave Desert, June, 1891; 999 Coville and Funston. Eastern slope of Walker Pass, Kern Co., 3,900 ft. alt., 1014 Coville and Funston.

++ ++*Sheaths somewhat obliquely truncate; tubercule continuous with the achene, seperable at maturity.*

7. **Eleocharis rostellata,** Torr. Fl. N. Y. 2:347.

Culms slender and wiry, lax, 3-5m. long, the sterile culms 1-1.5m. long, rooting at the apex; spikelets oblong, acute, lcm. long, and a third as thick, 10-20 flowered; scales ovate to ovate-oblong, stramineous or light brown, bristles 4-6, exceeding the oblong-obvoid (1.5mm.) achene; tubercle conic-subulate, less than one-half as long as the achene.

Probably common in wet meadows throughout the Cismontane region, but the only specimens seen are of my own collecting at San Bernardino. The species is found throughout temperate North America.

PLATE VII.

ELEOCHARIS MONTANA, (R. & S.)

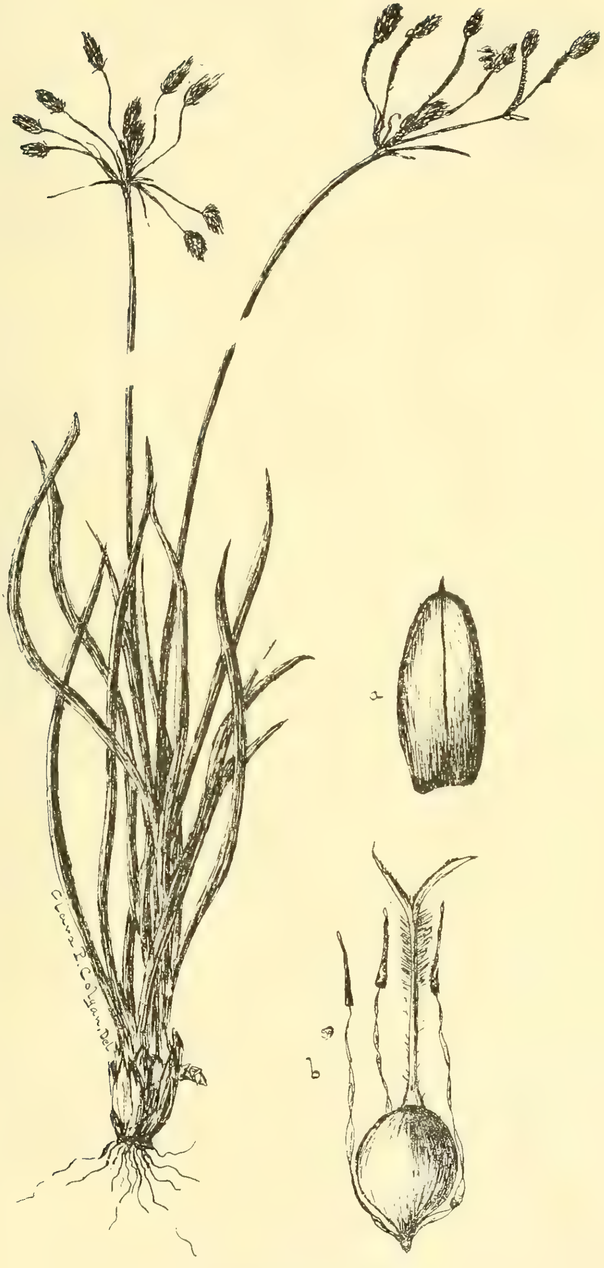


PLATE VIII

FIMBRISTYLIS THERMALIS, (Watson).

4. *FIMBRISTYLIS Vahl, Enum. 2:85.*

Annual or perennial herbs, with culms leafy at base. Spikelets terete, several or many-flowered. Scales all fertile, spirally imbricated, mostly deciduous. Perianth none. Stamens 1-3. Style 2-3-cleft, often flattened and ciliate, enlarged at base, but wholly deciduous at maturity. Achenes lenticular or 3-angled.

A genus of 150 species, or more, mostly of tropical or subtropical climes; sparingly represented in North America. The following is the only species reaching our region.

1. **Fimbristylis thermalis,** Watson, U. S. Geo. Expl. 40th Par. 5:360; Bot. Cal. 2:223.

Perennial by horizontal, jointed, scaly rootstocks; culms few-clustered, flattened, scabridous, 4-6 dm. tall; leaves 2-3 mm. wide, rough-margined, shorter than the culms; involucral leaves 2-4, much shorter than the rays, subulate, with broad pubescent bases; umbel compound, rays 3-8; spikelets 5-15, ovoid, becoming oblong at maturity and 2cm. long; scales pale brown, concave, oblong, 4 mm. long, the midrib excurrent as a stout mucro at the obtuse apex; stamens 3, the filaments flattened and the anthers tipped with a subulate appendage; style ciliate, 2-cleft; achenes ash colored, shining, minutely perpendicularly striate, obovoid to globulose, 1mm. long.

In soil moistened by warm water, Arrowhead and Waterman Hot Springs, 1750 ft. alt., in the foothills of the San Bernardino Mts., near the town of the same name: Parish. It has been collected at hot springs at several places in Kern and Inyo counties, and in Ruby Valley, Nevada. The type was collected in Owens Valley.

Plate VIII Plant: the umbel at the left in flower, that at the right mature, the scales mostly fallen away. a. Scale X6. b. Achene, X12.

The Bees of Southern California. V.

BY T. D. A. COCKERELL.

Xylocopa.

Fulvous, with fulvous pubescence; very large........ 1
Black 2
Dark blue or green 5

1. Abdomen largely fuscous (Khasia Hills, India).... ....**rufescens, Smith.**
   Abdomen entirely fulvous (So. Calif).............. ....**varipuncta,** Patton, male.
2. Large, over 25 mm. long (So. Calif)................ ....**varipuncta,** Patton, female.
   Smaller, less than 20 mm. long..................... 3

3. Clypeus yellow(California........**orpifex,** Smith, male.
   Clypeus dark 4
4. Top of head greenish, face with light hair (Surinam)..
   ....**barbata,** Fabr., female.
   Top of head black, face with black hair (California)..
   ....**orpifex,** Smith, female.
5. Bottle-green (Northern California)..**Californica,** Cresson.
   Dark steel-blue (So. Calif).......................
   ....**Californica arizonensis** (Cresson.)*

Xylocopa varipuncta. Patton.

Collected by Dr. Davidson at Los Angeles; I have taken it at the same place. It ranges east to Tempe, Arizona, where it has been taken in numbers by Mr. Irish. It is very interesting to find that an Indian species **(X. rufescens)** is so like the male of **varipuncta** that it is difficult to point to any important distinction. However, in **rufescens** both sexes are fulvous. My material of **rufescens** is from Mr. Sladen. **X. fimbriata.** Fabr., is said to have been taken in the Yosemite Valley, but I have little doubt that the specimens were **varipuncta. X. fimbriata** is a neotropical species; the most northern record that can be trusted seems to be Tepic, Mexico. It is easily distinguished from **varipuncta** by the fact that the female has a ridge on the vertex of the head, interrupted in the middle, and laterally elevated into conspicuous tubercles.

Xylocopa orpifex, Smith.

Obtained by Dr. Davidson at Los Angeles, Rock Creek and Tehachapi. It goes north to Oregon, and is one of the most characteristic bees of the Pacific Coast.

Xylocopa californica arizonensis, (Cresson).

Collected by Dr. Davidson at Los Angeles; it goes east to New Mexico, and Dr. L. O. Howard has collected it as far south as San Jose de Guaymas, Mexico. In Northern California it is replaced by the true **californica.** I reduce **arizonensis** to subspecific rank because it seems to have no valid structural characters, and the color is not altogether reliable. Mr. J. A. G. Rehn has very kindly compared Cresson's types of **californica** and **arizonensis,** and finds that both have the tubercle before the anterior ocellus in the female. The color is very different, but Mr. Rehn says that one of Cresson's types of **californica** has the abdomen colored as in **arizonensis.**

*The species from other regions are included for comparison.

Anthophora.

There are several species of **Anthophora,** belonging to the subgenus **Amegilla,** Friese, in which the hind-margins of the

abominal segments have a chalky-white, ivory-colored or occasionally quite yellow appearance, not at all due to hair. At first, they look very like the species with white or whitish hair-bands, but a close examination shows that the color is in the tegument itself. The males of these species may be distinguished as follows:

Face-marks white or whitish........................ 1
Face-marks yellow 5

1. Thorax with black and dull white hair mixed; sides of clypeus very broadly bordered with black; apex of abdomen with two short spines, (New Mexico)... ....**cleomis**, Ckll.
Thorax without black hair.......................... 2
2. Hair on thorax pale yellowish...................... 3
Hair on thorax dull white or grey.................. 4
3. Clypeus with subbasal black spots (Illinois)......... ....**Walshii**, Cresson.
Clypeus with subbasal short black lines (Colorado &c.) ....**Smithii**, Cresson.
4. Clypeus with subbasal black spots; apex of abdomen with a concave truncation (New Mexico)........ ....**marginata**, Smith.
5. Thorax with black hair............................ 6
Thorax without black hair.......................... 7
6. Length 13 mm. (Mexico)................**tarsata**, Dours
Smaller (So. Calif) ....**tarsata subtarsata**, n. subsp.
7. Hair of thorax fulvous (California to New Mexico).. ....**californica**, Cresson.
Hair of thorax whitish (Los Angeles, Calif)........ ....**quinquefasciata**, Provancher.

There remains one species, **A. texana**, Cresson, of which the male is unknown. The female has the hair of the thorax ochraceous, slightly mixed with black.

Anthophora tarsata subtarsata, n. subsp.

One of each sex taken by Dr. Davidson at Los Angeles. The female is a little less than 12 mm. long, and agrees with the description of **tarsata** except that it is smaller, the hairs on the sides of the ventral segments of the abdomen are white (pale fulvous in **tarsata**), the brush on the end of the first joint of the hind tarsi is ferruginous (black in **tarsata**), and the legs are black (expect for the hair) with only the tarsi dark ferruginous. It agrees in size with **A. texana** (from Texas), but differs by the hair on face and cheeks being ochraceous (white in **texana**), the apical part of the mandibles dark reddish (yellowish in **texana**), the hair of vertex and thorax being copiously mixed with black, and the abdominal segments beyond the first having much short

black hair. The male is a little over 11 mm. long, similar to the female but with the labrum, clypeus, supraclypeal band, lateral face-marks, large mark on mandibles, and under side of scape all yellow (reddened by cyanide in the specimen studied). The thoracic pubescence is quite bright fulvous, mixed with black. The apex of the abdomen is broadly rounded, with a deep median notch; not at all spinose. Legs colored as in the female; middle tarsi simple; hind femora greatly swollen; hind tibiae broad and thick, with a strong apical tooth; basal joint of hind tarsi broad, ferruginous, with two teeth, the first one much the longest. There is a small black spot on each side of the clypeus.

I had thought that this might possible be **A. quinquefasciata,** Provancher, which I have not seen; but Provancher describes the thoracic pubescence as ''blanche,'' and says nothing about any intermixture of black; neither does he mention any spines on the hind tibiae and tarsi.

BOMBUS.

Bombus californicus, Smith.

This handsome species is easily known by its black color, with the hair on the anterior part of the thorax, and a band on the hinder part of the abdomen, yellow. The typical **californicus** has the hair of the head black, but in the variety **columbicus** (Dalla Torre) the hair of the face and the middle of the top of the head is yellow. In the specimens seen by me, the malar space of the female is considerably larger in **californicus** than in **columbicus,** and for this reason I am strongly inclined to restore the latter to the rank of a species. It would be a matter of considerable interest for the naturalist of California to investigate the matter, and see whether the two kinds ever come from the same nest. Dr. Davidson has collected both kinds at Los Angeles, and the true **californicus** also on Catalina Island. A worker of **columbicus** was obtained by him at Bear Valley. The **columbicus** form was also collected by Mr. Ehrhorn at Alum Rock Park, San Jose, Calif., in 1902.

Bombus edwardsii, Cresson.

Two taken by Dr. Davidson at Los Angeles. Differs from **B. californicus** in having the hair of the scutellum and base of abdomen yellow. As regards the banding of the abdomen, **B. edwardsii** is to **B. prunellae,** as **B. ternarius** is to **B. juxtus.**

Bombus sonorus, Say.

San Pedro, common (Cockerell). Visits flowers of **Datura meteloides** early in the morning. A species with the pubes-

cence mainly yellow, but black between the wings and on the pleura.

Psithyrus californicus, (Cresson.)

Taken by Dr. Davidson at Los Angeles and Switzers. This is known only in the male, and in all probability it will prove to be a male **Bombus,** like the structurally similar "**P.**" **elatus.**

Flora of San Clemente Island. II.

BY BLANCHE TRASK.

There is but one man who knows San Clemente Island. This is John Robearts, and he has lived on the island over twenty years. I have named the most remarkable and picturesque of all the gorges on the north coast "Robearts' Gorge," in commemoration of his heroic explorations for the love of nature in its sternest forms. This gorge can be plainly viewed from a ship at sea, its pinnacles uplifted for a thousand feet. It lies a half hour's row westward from Mosquito Harbor and can easily be recognized.

Generally, there is that wind from the west; at times it brings a wild storm of sand, when the very air is thick and you have to watch your guy ropes from early morn to night, and 'tis well if even then the breath abates—yet gentle days intervene when the placidity is dream-like.

An interesting phenomenon may be constantly observed from the heights. Great banks of cloud seem continually to be drawn to the highest elevation on the north crest, and when about one mile off shore evidently there is encountered an opposing force, for turmoil ensues and dissolution follows, with the result that although the larger part of the cloud-rack continues its old course and reaches the height, yet another portion is lost. It hesitates, is carried far out to sea and eventually rounds the extreme west end and drifts along the dunes of the "Sou'-west Harbor."

"—Puts forth an arm and loiters,
slowly drawn——"

Once observed-twice-thrice! You begin to think it is more than an accidental occurrence. It gratified me afterward to find it was made note of by the U. S. Coast and Geodetic Survey. Johnny says it has been going on ever since he can remember.

In the deep gorges under these beclouded headlands and on the bold steeps is the growth remarkable as would be expected.

Small stunted groves of Lyonothamnus floribundus var.

asplenifolius are occasionally met on the south coast heights, but it is on the north coast that it ever follows—who can say why—ledges of exposed rocks as trails and under these beclouded crests it marches in long defiles like a conquering army, one to two feet in diameter; ten to twenty-five feet high; strong, heavy trunks, and never an entire leaf; it should stand as a species by itself; the same tree which thrives in similar exposures on Santa Cruz and Santa Rosa Islands, while on Catalina, the trees have a different aspect; entire leaves, and assume tall tapering figures.

Under these same heights in San Clemente, too, the oaks are seen in companies; Quercus tomentella and Q. chrysolepis, low and defiant often, with gray dead tops and outspread limbs; gnarled trunks one to two feet in diameter; you can skirt the coast-line in a skiff and look up and count the companies of the oaks and Lyonothamnus trees by defiles as you pass rowing; count them to the very summits.

The descent from the heights to the sea in these regions is perilous in the extreme. Clovers are four to six feet high, Trifolium tridentatum being the most common growth, is so dense under the feet that neither trail nor rocks can be discerned and you have to feel your way with hands and feet over jagged rocks, while the strong clovers trap you at every step like vines.

Trifolium Palmeri is common, nearer the sea than T. gracilentum or T. tridentatum.

Besides all these hindrances, there is yet to be mentioned the chains which guard San Clemente Island, whose links are caves innumerable. It is a relief to the eye to come across a stretch which has not its gaping rents; the gorge is everywhere present and the rock-strewn terrace and the leaping arroyo; but the light of the caves is the Convolvulus macrostegius.

There is one open mouth on the "nor'-west" coast where the Dendromecon flashes—never in truer glory or more profusion of bloom. It was also seen towards the East End at the heads of some of the precipitous dips, seven years ago, though of course not so large as in this protected mouth.

Antirrhinum speciosum is as common in every break as are the boulders which take their places as sand on the beaches; happy under all circumstances; enkindling the darkest gulches where the o'er-toppling walls are shutting out the sky.

Cereus Emory traverses the entire south coast, swinging from many a gaping cave, while Opuntia prolifera increases in numbers as you near the East End, until it fairly besets the trail, making it a serious undertaking for foot of man or beast. Opuntia Engelmanni var. littoralis is not frequent, but seems to bloom profusely and to bear well in an occasional spot.

Dr. Rose finds two new species of Stylophyllum and strangely enough, one hides in the west end and one at the east end of the Island—S. albidum and S. virens respectively.

Johnny tells me Viola pedunculata is singularly fragrant —"like the odor of peaches"; I found only the crisping pods and seeds.

White flowers, or white with veins of magenta, abound amid the ordinary magenta ones of Mirabilis California.

A new Astragalus spreads its silver leaves along the golden sands of the West End dunes; this is to be Robeartsii Eastwood, while A. Nevinii looks out at the "Sou'west" Arrowhead Point and seems by its very isolation to be preserved for future ages, its shaggy mantle of black hair recalling at once A. Traskiae found on San Nicolas Island, although the latter is a more handsome plant.

The Mesembryanthemum crystallinum at the west end very properly gives you not a thought beyond recognition of its usual happy style; but when it leaves its dunes and is your companion for miles and miles on the outspread uplands, you begin to give it more thought and to see that its sway is remarkable. Johnny says it increases yearly, and can recall when it never left the dunes. It now runs almost to the center on the tableland heights, to the exclusion of nearly all other plant-life; it soaks boots and leggings and makes "time" impossible in its region.

The little Eschscholtzia ramosa (which could never be confounded with Eschscholtzia Californica by any one who had been familiar with the former in the field, is often met in arid places, six to twelve inches high, its flowers usually not an inch in diameter, with ever a strange glaucous light upon its leaves.

A tree daisy truly is Encelia Californica found in "Chalk Cliff Canon;" one to four inches diameter and ten to twelve feet high.

Euphorbia misera holds a little colony of its own in the most picturesque of all the arrow-head points, where, in a broken edge, it is one to two feet high and one to three inches in diameter, with peculiarly blunted branches and creeping ways.

In many a moist nook of the great north coast gulches, thrives a Ribes, appearing strangely domestic and robust in these surroundings; becoming tree-like, even twelve feet high and eight inches in diameter, although it is usually shrubby.

The Prunus, which grows in all parts of San Clemente where it can gain a foothold, should be given specific rank; it is identical with the one at Catalina Island, which is not the

variety of Ilicifolia that it has been made. In the deep recesses of San Clemente's gorges, it attains a height of thirty feet with as great a spread, and measures one to three feet in diameter. The fruit is luscious—its pulp a quarter of an inch thick. The pits have been sent to Santa Ana to the experimental gardens, where Professor Pierce hopes to reduce the stones and increase the pulp, thus securing to California a cherry which will thrive in low-lands.

In one locality, Crossosoma Californicum was seen—a few shrubs ten feet tall crowded into a cleft, yet in both flower and fruit; a peculiar form of Rhusvata is on the same height, about four feet high shrubby.

Adenostoma is found on the arid heights of the north coast and Ceanothus macrocarpus at rare intervals; both ten to twelve feet high and one to six inches in diameter.

Sambucus glauca is a handsome tree in northern slopes, while Lonicera finds a few moist and shaded spots in which to thrive.

In one locality—an old harbor—Brassica nigra flourished six feet tall.

Senecio Lyoni stars the land, along with "the turquoise flower," Gilia Nevinii; with the fiery little snap-dragon Antirrhinum speciosum common; and along the sea-edges Eriophyllum Nevinii abides and, remembering the frequency of the dainty clover, Trifolium Palmeri, you have in San Clemente a galaxy, one plant of which is worth going a hundred miles to see.

The memory of a little clump of Lycium at the "Nor'-west harbor" was fresh in my mind upon my second trip last year; it looked different from usual and was of course not L. Californicum, which covers vast areas to westward; both fruit and flower upon my second trip confirmed my suspicions. Miss Eastwood sends word it is none other than Lycium Richii, the only known plant in the United States being at Avalon, although, to be sure, it is common in Baja California.

Finding Aphanisma blitoides along the sea-cliff edges and Malva exile in old Indian mounds was typical of what is known of their habits on Catalina.

Rhus integrifolia is here a shrub generally, although in favored situations it is over one foot in diameter.

Rhamnus crocea is an occasional sight in the south coast arroyos; old and gnarled trunks twelve to eighteen inches diameter.

A gay rose-pink Cnicus Occidentalis is not typical, but occasional here.

In the dunes Franseria and Abronia maritima and A. umbellata are seen.

The blending of Collinsia bicolor is on all the favored nooks toward the Pyramid Head, East End.

One shrub of Baccharis holds forth alone in the treeless region of the west end; while in the hot days of last November in the south arroyos, I came across two or three shrubs which appeared to be a "sp. nov." of Baccharis, according to Miss Eastwood.

At the far sand reaches of the east end one Atriplex Breweri(?) stands besides the sea; in November a beautiful sight of waving golden bloom eight feet tall.

A long disputed question of species of Suaeda was settled by finding a desired development on San Clemente shores; an insular form seen on San Nicolas and Sta. Barbara Islands.

The little Saxifraga blooms brightened all the arid western regions in November, bursting as by magic through the hard soil; also Eriogonum nudum and E. gigantea were frequently beheld; while Atriplex expansa was ever "tumble weed" in the trail, an actual encumbrance.

A new Malacothrix overhung many an inaccessible gorge in October and November, with its great masses of lavender flowers in atonement for its rank leaves; another Compositae which was not in bloom, was found in better condition in June and may prove a Hazardia interesting; also yet another species of Hazardia was discovered in a remote canyon.

Galium Catalinense was often seen in happy state-climbing; Lotus Traskiae in some localities, though rare; a strange Castilleia here flourishes, with rich canary-colored bracts shrubby, two to four feet tall.

On the main southern flats in May, Plantago Insularis and Oligomeris were common; while Phacelias lay along the trail like bits of fallen sky.

Lamarkia aurea, the "Knight's Plume" of Catalina waves also here.

An old Lupine which has long grown at Catalina and which seem to be a variety of L. truncatus was frequently seen in San Clemente Island also, besides other Lupines which sprang easily in that rich old soil.

Lavatera assurgentiflora was twice found—one tree eight inches in diameter—looking into the sea from a cliff near Mosquito Harbor; another in a region of Pot's Valley pointed out to me by Johnny; it was a foot in diameter and twelve feet high; low and bent and splitting at base.

Johnny tells me that formerly there were many "Malva Rosas" as he calls them; some even on the south coast; mostly

eaten by cattle in years when feed was scarce. He recalls their forming groves.

Malva parviflora grows in abundance near Gallagher's; is often six feet tall.

Marubium vulgare is to be seen at the "Nor'-west Harbor" along with Salicornia in fine condition in a sort of marsh-inland.

A peculiar form of Oenothera, for long years known at Catalina, is to receive recognition at last. Common near the sea, prostrate—with curling bark—woody at base.

An "island" of Hemizonia fasciculata above Pot's Valley attracts wonderment amidst the sea of Mesembryantheum which surrounds it.

Hemizonia Clementina Brandegee is a shrubby form which is often seen one to two feet tall towards the westward; this also grows in Catalina.

The gay flowers of Pentstemon cordifolius which merit the common name of "Coral String" given them in Catalina, surprise you in many an opening in a gorge on the north coast.

PUBLICATIONS RECEIVED.

"Bulletin of the New York Botanical Garden," Vol. 3 No. 10.

"Poultry Management," Maine Agricult. Exp. Station. Bulletin No. 100.

"Plantal Yucatanae," Field Columbian Museum, Val III, No. 2. Botanical Series.

"Proceedings of the Sixteenth Annual Meeting of the Association of Economic Entomologists," U. S. Dept. Agricult. Bulletin No. 46. Entomology.

"Experiment Station Record," U. S. Dept. Agricult. Vol. XV. No, 8.

"Spindle Formation in the Pollen—mother—cell of Cassia tomentosa." L. by Henri T. A. Hus. Proceedings of the Cal. Acad. Sciences, Vol. 2, No. 2. Botany.

"Missouri Botanical Garden, Fifteenth Annual Report."

Transactions for May, 1904.

ASTRONOMICAL SECTION.

The regular monthly meeting of the Section was held this evening at the usual hour and place. In the temporary absence of the chairman the meeting was called to order by the secretary, and Mr. B. R. Baumgardt was appointed chairman pro tem. This being the constitutional time for the annual election of officers, that business was entered upon, resulting in the choice of Mr. Wm. H. Knight as chairman and Mr. Melville Dozier as secretary for the ensuing year. The acting chairman then read an extract from "Nature," giving the views of Prof. Mendeleef, a noted chemical philosopher, relative to the more attenuated gases of space, in which he contravenes Thompson's theory of electrons.

The paper gave rise to some interesting discussion, participated in by Dr. Bullard and Mr. Baumgardt, but without definite conclusion.

Mr. Baumgardt called the attention of the Section to the important astronomical constructions and improvements projected and under

way at Mount Wilson and Mount Lowe, under the supervision of Prof. Hale of the Yerkes Absorvatory and his associate astronomers.

This is justly regarded as a matter of congratulation, not only on behalf of the Astronomical Section, but as well on the part of the entire Academy and the community at large.

Chairman Knight having arrived, with the speaker of the evening, the chair was surrendered to him and in the course of certain felicitous remarks, he introduced Bishop Warren of the Methodist General Conference. The Bishop, who is the author of some works on astronomy, and a man of broad culture and accurate scientific attainments, proceeded to entertain and instruct the Section in a most delightful manner.

In eloquent terms he depicted the fascinating beauties of astronomy, intermingling with the serious and the severely scientific much of his charming wit.

At the close of Bishop Warren's address, the chairman presented the subject of La Place's "Invariable Plane," indicating the views of certain eminent mathematical astronomers in regard thereto, and illustrating the same by diagrams.

After some discussion of this topic by the chairman and Mr. Baumgardt, the meeting adjourned.

MELVILLE DOZIER, Secretary.

May 16, 1904.

BIOLOGICAL SECTION.

The meeting was called to order by the chairman. The minutes of the last meeting were read and approved.

A brief report on the Trichina spiralis illustrated by a microscopic specimen was presented by Mr. Whiting.

Prof. Ulrey reported that Prof. Ungo de Fries was going to carry on extensive investigations at the University of California during the coming summer, on the problem of the Origin of Species.

Prof. A. B. Ulrey was elected chairman and C. A. Whiting was elected secretary.

The lecture of the evening was given by Dr. Leonard, City Bacteriologist, on **Some Bacilli related to the Bacilli of Tuberculosis.**

The lecture was instantly interesting and highly practical. The lecturer pointed out the fact that there are certain barteria which live upon grass whose staining reactions are the same as the bacillus of tuberculosis. The speaker expressed the opinion that the bacilli of human tuberculosis and bovine tuberculosis are identical, but stated that further investigation is necessary to positively prove their identity.

A great many questions bearing on the practical side of the work of the bacteriologist were asked and were clearly answered by Dr. Leonard.

About forty-five members and visitors were present.

The Section adjourned to hold its final meeting for the year on the second Monday in June.

C. A. WHITING, Secretary.

May 9, 1904.

VOL. III. OCTOBER, 1904 NO. 7

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION
THEO. B. COMSTOCK, S. D.; A. DAVIDSON, C. M., M. D.; WM. H. KNIGHT.

CONTENTS:

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MAILED OCTOBER 27, 1904

Important to Members

The Board of Directors has instructed the Committee on Publication to employ every possible means to make the Bulletin an efficient means of communication with the members of the Academy, and we indulge the hope that our endeavors may lead to greater interest than has heretofore been shown in the important aims of this worthy organization.

But we are compelled to be frank and to inform the members that the financial support given to the Board is now entirely inadequate to the needs. A little effort on the part of each to add to the membership will mean much in growth and increased influence of the Southern California Academy of Sciences. **See that your dues are promptly paid, and secure one or more members. IT WILL PAY YOU WELL.**

A very important step was taken by the Board in accepting the courteous offer, by the authorities of the Southern California State Normal School, of the use of suitable rooms for the meetings of the Academy and its sections, the limited quarters at the Chamber of Commerce having proved expensive and inadequate.

The position occupied by the Southern California Academy of Sciences is too little understood in this community. Quietly, but steadily, for a dozen years, a little band of devoted workers has been building up an organization which is accomplishing much good in two important directions.

First—We do not believe that its own members fully realize the extent of its contributions to knowledge of local natural history.

Secondly—The Academy has stood for the popularization of Science, not by cheapening nor by lowering the standard, but by presenting to the public in simple language the results of technical research in various branches.

There is a spirit in the Board of Directors and in the several working sections, which will not permit any falling off along these lines. So far as lies in the power of the officers, each succeeding year will show adequate gain in strength and effectiveness. Already the Bulletin, the official mouthpiece of the Academy, has taken high rank for its contributions in special lines of Science. We must not stop where we are. Surely there are men and women enough in Southern California who are in sympathy with the purposes of this organization to provide by annual dues for the mere sustentation of such an institution in our midst. One good friend, whose modesty keeps his name out of this writing, has always shown his faith by his works; but among the many whose means are ample, there are few to rise to a clear perception of what space our Academy actually fills in the moral and intellectual life of this region. It is not too late, but neither is it too early, to lay plans for wider growth and greater influence. We sorely, sorely need a home of our own, centrally located, where the library we are accumulating and the museum we can have without asking may be housed securely, and where the willing hands we have at command may undertake the tasks which belong to us, and not to those who now perform them from afar with funds supplied elsewhere.

What will you do, kind reader, as your share in this undertaking? What will you do today? If not a member, aid us by joining the Academy, not only to increase needed funds, but to encourage us by your presence at lectures and by suggestions from your experience. If already one of us, do not rest content until you have told others of our plans and work. If you are benefited, help us to enlarge the sphere of our influence by adding to the membership.

This issue of the Bulletin is especially designed as a campaign document. Our motto is: "*Never let up, never let down.*"

Annual Report of the Secretary to May 1, 1904

To the Board of Directors of the Southern California Academy of Sciences:

Gentlemen: I herewith present the report of the Southern California Academy of Sciences for the fiscal year 1903-1904.

The Sessions opened September 11, 1903, and closed May 2, 1904.

This, the 13th year of activity of the Southern California Academy of Sciences, has been one of unusual interest and value to its members. The number of lectures given by the Academy and its Sections was 28; these have been confined to scientific subjects. While, perhaps, the attendance has, on the whole, not been as satisfactory as in former years, it has, nevertheless, been as large as could be expected, bearing in mind that the Academy has been constrained to hold its Sessions in the residence section of the city.

The attendance has also been such as to indicate that the purpose of the Academy lectures should be to lay special stress on popularization of science.

Summary of Lectures by the Academy and Its Sections.

"Late Results in Celestial Photography," by B. R. Baumgardt.

"Earthquakes," by F. C. Crosby.

"Scientific Commercial Standards," by Alvin H. Low.

"Ether and Gravitational Matter," by Edward L. Larkin.

"Deposits of Alkaline Salts," by Julius Koebig.

"The Cactaceae," by A. D. Houghton.

"Radium," by Edgar L. Larkin.

"The Sun as the Lighthouse and Furnace of the Earth," by John Woodbridge.

"Origin of Petroleum," by C. J. Callahan.

"The Technique of Blood Examination," by Louisa Burns.

"Concerning Fleas," by J. J. Rivers.

"The So-called Kissing Bug," by Anstruther Davidson.

"The Manufacture of Explosives," by E. H. Fosdick.

"Oxygen," with experiments, by Wm. M. Friesby.

"Sweden," by B. R. Baumgardt.

"Herbert Spencer's Symposium," by President Comstock, Rabbi S. Hecht, Elizabeth Cheney, W. A. Spaulding, W. A. Cheney, B. R. Baumgardt.

"Malaria," by F. B. Gamber.

"Physical Geography and Geology of Brazil," by Theo. B. Comstock.

"The Nissl Bodies," by Louisa Burns.

"Radio-Activity of Metals," by E. M. Wade.

"Anemia and Leukemia and Ehrlich's Theory of Immunity," by C. A. Whiting.

"Food and Food Products and Their Adulterations," by Julius Koebig.

"Midwinter Birds of Los Angeles, Etc.," by Joseph Grinnell.

"Autogeny and Phylogeny of the Eye," by Lyman Gregory.

"The Sun" (illustrated), by George E. Hale.

"The Larval Balanoglossus," by B. M. Davis.

"The Chemical Geology of Sedimentary Deposits," by Frank I. Shepherd.

"The Relation of Electricity and the X-Ray to Radioactivity," by O. Shepard Barnum.

"Mineral Formation and Crystalization," discussed by G. Major Taber and Theo. B. Comstock.

"The Principles of Logarithms and the Paradox of the Conchoid Curve," by B. R. Baumgardt.

"Some Bacilli Related to the Bacilli of Tuberculosis," by Dr. Leonard.

"Cliff Dwellers of the Southwest," by Mrs. Charles Nelson Green.

"The Trisection of an Angle," by Melville Dozier.

"Desert Views and Desert Development," by John Stewart.

"Polarization of Light," illustrated. S. J. Keese, demonstrator, with explanation by Messrs. Dozier, Whiting, Houghton and Comstock.

Financial.*

Received from membership and dues	$591.00
Gift from Mr. J. D. Hooker	100.00
Total	$691.00
Paid over to Treasurer	$691.00

There has been added to the Academy during the year one life member, Dr. Theodore B. Comstock.

The only source from which the Academy draws its income at present is the membership dues. These are barely sufficient to cover the expenses, which are principally made up of the expense of publishing the Bulletins, hall rent and lantern services. The Secretary, therefore, desires to take this opportunity of expressing the hope that all members, in the future, will pay their dues promptly and that each member will also consider himself a committee of one for the purpose of bringing in new members to the Academy and especially, if possible, some life members. The Academy needs funds for various undertakings which, on account of the expenses involved in same, it finds itself unable at present to undertake.

B. R. BAUMGARDT, Secretary.

———————

Professor Melville Dozier, Vice President of the State Normal School, now President of the Academy, is peculiarly fitted for the honor justly conferred upon him. His work for years as a member of the Board of Directors and as an officer of the Astronomical Section, as well as his important papers read before the Academy and Section evince great interest in the aims and purposes of the Academy, and he has taken hold of the new duties with an earnestness which bespeaks good progress in the current year.—[Editor.]

*The Constitution provides for an annual meeting of the Academy in May, at which time it is expected that the reports of Secretary and Treasurer will be presented. Inasmuch as the Treasurer goes out of office at the beginning of June and his final report must be made up to May 31st, there is liable to be some discrepancy in the receipts reported by the two officers. This will be overcome by the new rule of the Board placing the collections in the hands of the Treasurer. At the first meeting of the new Board in June, 1904, the Auditing Committee reported the accounts of the Treasurer correct and in order, the difference apparent in the two reports at the Annual Meeting in May having been due to the above cause. By closing the Treasurer's books in June the discrepancy disappeared.—[Ed.]

Annual Report of the Treasurer to May 31, 1904

To the Board of Directors, Southern California Academy of Sciences:

Gentlemen: I have the honor to submit the following financial report for the fiscal year ending May 31, 1904.

Reported receipts by A. Davidson, Treasurer, May 1 to Sept. 21, 1903 (including amount on hand May 1)	$357.99
Reported disbursements	306.98
Balance turned over by former Treasurer	$ 51.01
Total receipts from Secretary, Sept. 22, 1903, to May 31, 1904	$468.88
Total receipts by present Treasurer	$519.89
Total disbursements by present Treasurer	519.11
Balance on hand May 31, 1904	$ .78
Disbursements, as below:	
Printing of Bulletins and notices of meetings	$286.11
Rent of hall	210.00
Sundry expenses (collections, advertising, hire of lantern, etc.)	23.00
Total	$519.11

Outstanding accounts are fairly offset by uncollected dues of members, there being practically no surplus above running expenses.

Respectfully,

G. MAJOR TABER, Treasurer.

Report of Section of Astronomy for Year 1903-1904

The Section has held regular monthly meetings during the year, with fairly good attendance and excellent interest in the subjects presented for consideration.

The topics considered during the year have covered quite a wide range, including some that were purely astronomical, and others that were astro-physical.

The December meeting was of unusual interest, having been devoted to a symposium on the life and character of Herbert Spencer, participated in by several members of the Academy and by several scholarly gentlemen from without.

At the January and February meetings the Section was highly favored by the presence of Professor Hale of the Yerkes Observatory, who delivered most interesting and instructive lectures on the Sun, a subject on which he has become a recognized authority.

In connection with Professor Hale's work the Section congratulates itself and the Academy and the scientific interests of the community at large that the favorable conditions of our atmosphere have induced the authorities of the Yerkes Observatory to establish a station for solar study and observation on Mount Wilson.

This is an enterprise that appeals to the appreciation of every citizen but especially to that of the Academy of Sciences.

At the March and April meetings of the Section, the topics were in the field of pure mathematics, being respectively the principles and

practical value of logarithms, the properties of the conchoid and of the cycloid curves and the method of trisecting an angle, all of which developed points of real interest to the members.

At the May meeting the Section enjoyed another rare treat in the presence of Bishop Warren of the Methodist Conference, a man of astronomical erudition and reputation, who made a delightful address before the Section.

The Section is greatly indebted to its energetic and capable Chairman for the well sustained interest in its monthly gatherings.

MELVILLE DOZIER, Secretary.

WM. H. KNIGHT, Chairman.

Annual Report of Section of Biology

I have the honor to make the following report of the work done in the Biological Section of the Academy for the year:

During the year ending June, 1904, the Biological Section has held nine meetings. The average attendance of the meetings has been about forty. The subjects discussed in these meetings are of such deep interest and are so creditable to the Section that I present you with a list of all of the formal lectures:

Dr. A. D. Houghton, "The Cactaceae."

Dr. Louisa Burns, "Blood Examinations and the Nissl Bodies."

Dr. C. A. Whiting, "Anemia and Leukemia and Ehrlich's Theory of Immunity."

Prof. Joseph Grinnell, "The Mid-Winter Birds of Los Angeles and the Geographical Distributon of Animals."

Dr. B. F. Gamber, "Malaria."

Dr. Lyman Gregory, "The Autogeny and Phylogeny of the Eye."

Prof. B. M. Davis, "The Larval Balanoglossus."

Dr. Leonard, "Some Bacilli Related to the Bacilli of Tuberculosis."

Aside from the formal lectures, which I have presented, there have been a great number of very interesting and valuable discussions.

At a considerable number of the meetings there have been exhibitions of microscopical preparations, some of them of deep scientific interest and others very interesting from a popular standpoint.

Every effort will be made next year to make the work of the Section of even greater value to its members and to the public than it has been in the past.

Very respectfully submitted,

C. A. WHITING, Secretary.

A. B. ULREY, Chairman.

Annual Report of Section of Geology for Year Ending June, 1904

The meetings have been well attended and much interest has been shown throughout.

September 28, 1903, Prof. Julius Koebig, city chemist, lectured on "The Deposits of Alkaline Salts" and their method of formation.

October 26, Mr. C. J. Callahan gave an interesting talk on the "Origin of Petroleum."

November 23, Prof. E. H. Fosdick favored us with a very instruc-

tive lecture on ''Explosives, Their Manufacture, etc.,'' exhibiting samples.

December 28, President Theo. B. Comstock delivered a highly instructive and entertaining lecture on ''Physical Geography and Geology of Brazil.''

January 25, 1904, Mr. E. M. Wade gave a talk on ''Radium,'' exhibiting the millionth part of a grain, and was followed by Dr. Arthur Houghton on ''Radio-Activity of Metals.''

February 22, Prof. Frank I. Shepard of University of California read a very interesting paper on ''The Chemical Geology of Sedimentary Deposits.''

April 25, Mr. G. Major Taber had a paper on ''Mineral Formation and Crystalization,'' and exhibited several specimens. President Comstock followed, treating the subject from a scientific standpoint.

May 23, Ex-President Wm. H. Knight read an interesting poem on the Tribolite, and Mrs. Charles Nelson Green of Colorado gave a very interesting paper on the ''Cliff Dwellers of the Southwest.''

Owing to the inclemency of the weather, the meeting intended for March was necessarily postponed. We shall hope in the coming year to make all meetings of still more value and interest than they have been in the past.

G. MAJOR TABER, Secretary.

GEO. W. PARSONS, Chairman.

Publications Received

''Some Miscellaneous Results of the Work of the Division of Entomology.'' Entomology Bulletin No. 44 U. S. Department of Agriculture.

''Carnegie Museum Annual Report, 1904.'' Pittsburgh, Pa.

''The Farm Separator.'' U. S. Department of Agriculture, Bureau of Animal Industry, Bulletin No. 59.

''The Southwest Society of the Archaeological Institute of America.'' ''Something About Its Aims and Its First Year's Work.''

''A List of the Publications of the U. S. National Museum.'' Smithsonian Institute Bulletin No. 51.

''A Fossil Egg From Arizona.'' University of California, Geology, Bulletin No. 19.

''Euceratherium, a New Ungulate From the Quaternary Caves of California.'' University of California, Geology, Bulletin No. 20.

''Report on the Habits of the Guatemalan Cotton-Boll-Weevil Ant.'' U. S. Department of Agriculture, Entomology, No. 49.

''The Useful Properties of Clays.'' U. S. Department of Agriculture, Circular 17.

''Methods for the Detection of Renovated Butter.'' U. S. Department of Agriculture, Circular 19.

''Parergones del Instituto Geologico de Mexico.'' Tomo I, No. 2, pp. 3-26, 3 Pl., 1904. I. ''Notes on Physiography, Geology and Hydrology of Lower California.'' By Dr. Ernest Angermann. (Translation.) II. ''Area Covered by the Eruption of the Volcano Santa Maria, October, 1902.'' By Dr. Emilio Boese. (Translation.)

''Annals of Carnegie Museum'' (Pittsburgh). Vol. II, No. 4. August, 1904.

''Mining Magazine.'' New York, Sept., 1904. Vol. X, No. 3.

''American Journal of Archaeology.'' 2nd Ser. July-September, 1904. Vol. VIII, No. 3.

TRANSACTIONS

I. SESSIONS OF THE ACADEMY.

1. Academy Reception, June 6, 1904.

The Annual Reception of the Academy was held at the residence of Mr. S. J. Keese, 1509 Shatto street, on Monday, June 6, 1904, at 8 p. m.

The President of the Academy, Dr. Theo. B. Comstock, presided and Geo. W. Parsons was chosen Secretary pro tem in the absence of the regular secretary, Mr. Baumgardt.

The Treasurer presented his final report, which was received and filed after explanation of apparent differences between it and the report of the Secretary, due to closing at different dates.

Reports of the Sections of Biology, Astronomy and Geology were filed in writing by the respective secretaries after being duly read and received by the Academy. Dr. S. M. Woodbridge, Secretary of the Section of Agricultural Chemistry, also gave an interesting verbal report of the year's work.

All these Section reports show careful and patient work during the past year and increasing interest along the several lines of study and research, auguring well for the future of the Academy. Mr. Keese, the host, then gave an exhibition of Microscopic Projections of Crystals and other objects showing the beautiful effects of polarization, explanations being made at the same time by Dr. Whiting with physiological specimens and Professor Dozier of the principles of polarization, in very clear and interesting talks, they being followed by Dr. Comstock and Dr. Houghton, who also elucidated clearly and concisely some technical points.

A vote of thanks was then tendered Mr. Keese for his kindness and trouble in providing entertainment.

Dr. Theo. B. Comstock retired from his office as President of the Academy, in a few well chosen words, and Professor Dozier assumed the office with expressions of congratulation for work done faithfully and ably by the retiring president. Dr. Comstock responded, thanking all for the earnest and hearty support given him during his two years of administration. Dr. Whiting, in strong terms of praise for what Dr. Comstock had accomplished, proposed resolutions of thanks, to be spread upon the minutes and an engrossed copy sent to retiring president. Dr. Houghton heartily seconded the motion, which was carried unanimously, the resolutions to be drawn up by the movers thereof and duly presented.

The meeting then adjourned.

GEO. W. PARSONS, Secretary Pro Tem.

2. Regular Session, September 5, 1904.

The first general meeting of the Academy for the season of 1904-1905 was held at the Chamber of Commerce hall Monday evening, September 5, 1904, President Melville Dozier in the chair. It was addressed by Prof. Wm. H. Pickering, of the Harvard Observatory. He spoke of his recent observations of the moon, made in the clear skies and ''good-seeing'' atmosphere of the Lowe Observatory on Echo Mountain. He had detected what he believed to be evidences of activity and possibly of vegetable life on the moon. He noticed that, after the long lunar night of two weeks, small patches of white would turn to a grayish or brownish hue under the powerful rays of the sun

in the long lunar day. Also that deep cracks or ravines—at first almost black—changed to a grayish tint and broadened out to a measurable extent. He accounts for the latter phenomenon by assuming that there is a little moisture beneath the surface in these localities, and that the heat of the sun melts the frozen crystals and instantly transforms them into vapor which rises to the surface and fills the depressions, broadening out to visibility.

Regarding the brown patches, he thinks there may be a low form of vegetation capable of quick growth and development, which would account for the slight change in color perceived from the vantage site of the Lowe Observatory, but also previously noticed at the Arequipa Observatory in the high Andes, over which Prof. Pickering presided for some years. Other astronomers have noted these lunar markings and their verity is now conceded, but there is not a perfect agreement as to their cause.

Referring to the so-called canals of Mars, Prof. Pickering believes they are caused by the same agency, but acting on a larger scale, and on a body in which the atmosphere and vapor are not wholly absorbed into the interior. He does not admit that there are any seas on the surface of Mars. But the canal appearance is produced by vapor being exuded from long, deep cracks and spread along the margin to such an extent as to make the phenomenon visible under good-seeing in our powerful telescopes.

Prof. Pickering's lecture was preceded by Secretary Baumgardt's account of an interesting gathering of astronomical workers on Mount Wilson. Prof. George E. Hale, Director of the Yerkes Observatory; Dr. Herbert H. Turner, Director of the Oxford University Observatory; Prof. G. W. Ritchey, Optician of the Yerkes Observatory, and Prof. Wm. H. Pickering of the Arequipa Observatory in South America were among the distinguished astronomers Mr. Baumgardt met on that occasion. They were on Mount Wilson inspecting the new instrument now being installed by Prof. Hale for furthering researches into the constitution of the sun. This instrument is a coelostadt, and the tube, five feet in diameter, is 145 feet in length, and imbedded in solid granite. The tube is horizontal and fixed, a large plane, movable mirror reflecting objects from every portion of the heavens into the tube where the image is magnified to any desired degree. The summit of Mount Wilson is 5886 feet above sea level and about thirty miles northeast of Los Angeles. It was selected from among many other sites examined as being the most suitable from which to conduct Prof. Hale's astrophysical investigations of the sun.

President Dozier announced that an arrangement has been effected with the Trustees of the State Normal School which gives the use of one of the halls to the Academy of Sciences for its general and section meetings on each Monday evening during the season of 1904-1905.

WM. H. KNIGHT.

II. MEETINGS OF SECTIONS.

No meetings of Sections are held in June. The Board of Directors, by advice of the Chairmen, on account of the difficulty of getting speakers and gathering audiences earlier than October, passed a resolution suspending the meetings of all Sections in September, also. Regular meetings will be resumed in October, at the State Normal School.

Section of Geology, April, 1904.

(Through inadvertence the following brief minute of the April meeting of the Section of Geology was omitted from the May Bulletin, the proceedings of the Section for May being substituted therefor.)

The regular meeting of the Geological Section was held at the Chamber of Commerce hall April 23d. In the absence of Chairman Parsons, Dr. Theo. B. Comstock presided. After the reading of an amusing poem on the Trilobite by Mr. Wm. H. Knight, the Chairman and Secretary introduced Mrs. Charles Nelson Green, Vice Regent of the Cliff Dwellers' Association of Colorado, who gave an interesting account of the Cliff Dwellers of the Southwest. With some reference to the various speculative theories of the origin of the Cliff Dwellers the speaker remarked that the once abundant foot prints in the arid lands of Colorado, Utah, New Mexico and Arizona of millions who once inhabited those regions have long since passed away. The traces of their occupancy are now to be found in the utensils, pottery and mummified remains which constitute, with the relics of their dwellings, their legacy to history. She described the evidences of their mode of life to be gleaned from pictures on the rocks and from remains of their homes sculptured out of the rocks or walled up tenements on the cliffs.

In the profitable discussion which followed, remarks were made by the speaker and by Mrs. C. R. Olney, Messrs. Knight, Butterworth, Comstock and others.

At the close of the meeting the officers of the Section, Mr. Geo. W. Parsons, Chairman, and Mr. G. Major Taber, Secretary, were re-elected to serve for the year 1904-1905.

G. MAJOR TABER, Secretary.

III. DIRECTORS' MEETINGS. (Not Previously Reported.)

The Board met May 13, 1904, at the Office of President Comstock, who occupied the chair. All members present except Mr. Hooker. Mr. M. R. Preston was elected to membership in the Academy. Mr. Geo. W. Parsons tendered his resignation as member-elect of the Board for the following year, and the same was accepted.

An earnest discussion followed on the prospects for a permanent home for the Academy. Dr. Woodbridge, who had previously been appointed a committee of one for this purpose, reported progress in the matter.

Voted that the Constitution and By-laws and list of members be printed in the next number of the Bulletin.

A number of bills were approved and ordered paid.

B. R. BAUMGARDT, Secretary.

The Board met at 1:00 p. m., June 4, 1904, at the Office of President Comstock, who presided. Report of previous Board Meeting, May 13, was read and approved. The report of Auditing Committee was received and referred back for adjustment of reports of Secretary and Treasurer to an equivalent date, as of June 1, 1904, in accordance with the Constitution, with instructions to audit the Treasurer's accounts and report at first meeting of the new Board.

Professor A. H. Chamberlain, of Throop Institute, of Pasadena, was elected to membership.

Upon motion of B. R. Baumgardt, voted that in the future all collections of membership dues and other resources of the Academy be attended to by the Treasurer, with the aid of the Assistant Treasurer,

thus relieving the Recording Secretary of all responsibility for these collections.

Voted that the membership dues be hereafter pro-rated by the month, for the first year, of persons joining the Academy after the beginning of the fiscal year.

Adjourned sine die.

B. R. BAUMGARDT, Secretary.

Board met at Chamber of Commerce Committee Room on Tuesday, June 7, 1904, at 4:30 p. m. President Dozier presided. Present, Messrs. Comstock, Knight, Taber, Parsons and Baumgardt. To fill the vacancy in the Board of Directors caused by the resignation of Mr. G. W. Parsons, Dr. C. A. Whiting was unanimously elected.

Mr. Parsons, whose resignation had previously been accepted, is returned to the Board by virtue of his election as Chairman of the Section of Geology.

Mr. G. Major Taber was re-elected to the office of Treasurer of the Academy.

Voted that, unless the financial condition of the Academy be improved, the Bulletin shall be issued quarterly, beginning with the issue for October, 1904.

President Dozier announced the appointment of the Standing Committees, as provided by the Constitution, the Secretary being added to the Program Committee by vote of the Board at this meeting.

(See list of Standing Committees elsewhere in this Bulletin.)

Adjourned.

B. R. BAUMGARDT, Secretary.

Board met at Chamber of Commerce Committee room at 4:30 p. m., September 12, 1904. President Dozier presiding. All members present except Mr. Hooker.

President Dozier announced that the authorities of the State Normal School had granted permission to use such rooms as may be required on Monday evenings, for the meetings of the Academy and its Sections, the necessary expenses of such meetings to be paid by the Academy. The courtesy was gratefully accepted and an unanimous vote of thanks tendered. By vote of the Board the weekly meetings will hereafter be held at this place.

This disposing to some extent of the hindrance from lack of funds, it was resolved to continue the monthly issue of the Bulletin for the remainder of the calendar year, in the hope that enough interest may be aroused to enable the Publication Committee to continue the same monthly next year.

Mr. B. R. Baumgardt, Secretary of the Academy, was chosen as Delegate to the International Congress of Arts and Sciences to convene at St. Louis September 19-25.

A proposition of Dr. Davidson to recommend to the Academy a reduction in the amount of annual dues now assessed was discussed and made special order for the next meeting of the Board.

Voted that no meetings of Sections be held in the month of September this year.

Adjourned.

B. R. BAUMGARDT, Secretary.

Government Game Refuges*

BY ALDEN SAMPSON, A. M., HAVERFORD, PA.

(Read before the Academy Oct. 3, 1904)

The arguments here adduced are the result of personal observations and special studies made in a trip, aggregating some thirteen thousand miles, during the summer of 1903, while engaged in inspecting forest reserves of California and Washington for the purpose of selecting tracts to be set aside as refuges and breeding grounds, and to enable the representative of the Government to report intelligently on this general plan of Game Refuges.

The existing conditions are not conducive to the most satisfactory results in game preservation, so far as the control of public forest reserves is concerned. It is my own opinion that the Department of Agriculture, through its efficient Bureau of Forestry, should have the charge of the forest areas. The Land Office, a bureau of the Interior Department, is now in actual control of the reserves, although the Bureau of Forestry—a scientific, non-political body—is often supposed to be responsible for what it has no power to prevent. It should be clearly understood that, however free this department may be to act in certain directions, it cannot prevent depredations, the kindling of forest fires, or the destruction of game, except in very limited degree.

The idea of establishing game preserves, as such, is not new. In Europe, e. g. in Russia, Germany and Great Britain, certain wild animals have long been protected by governmental edict, not always from motives higher than the assurance of pastime for royalty or the maintenance of the chase among the gentry. Game laws are not rare in our several states, and to a certain extent, more especially with the smaller species, these are fairly effective hindrances to extinction of wild animals. In the case of big game, however, several causes have operated to distract attention of law-makers and public spirited citizens, who have rested secure in the belief that possible danger from excessive breeding is a convincing argument in favor of the "let alone" policy. Such persons could not have been aware of the ruthless slaughter which has been going on for decades past, and which has resulted in all but extinction of several types of the larger animals, such as the Bison, Grizzly Bear, Elk, Antelope and Mountain Sheep. Fortunately the refuge afforded by the Yellowstone Park has checked this

*The author of the paper of which an abstract is here given, was recently Game Preserve Expert in the U. S. Biological Survey.

devastation, at least in the cases of the bison, antelope and elk, and the experience thereby gained has taught good lessons for our future guidance.

Whether the control of the forest reserves shall pass to the Bureau of Forestry, or otherwise, there can be no more appropriate site for big game refuges than within these tracts. The same spirit which was the cause of reckless waste of wealth in timber, through forest fires and the grazing of sheep, is evident in the wanton destruction of hordes of game for the mere lust of killing, which is as far removed from sportsmanship as bloody war from the homely arts of peace. But the craft of the hunter is now more sorely taxed by the cleverness of the hunted, who have come to know their danger and to flee from it. It is surprising how quickly the pursued learn to realize the safety of the refuge tracts. This fact disposes of all the force there might be in the argument that the reservation of such protected areas will destroy the rightful hunter's privilege, and require the segregation of vast areas of unproductive territory.

From careful observation and experience elsewhere, it is now very apparent that the best results will come from small refuges, say about four townships, or twelve square miles, scattered with considerable intervals intervening.

There is far more immediate danger, and greater future menace to vested interests and the progress of civilization, in the threatening devastation by tame sheep than could ever arise from undue multiplication of the most ferocious wild animals. As a matter of fact, bears and mountain lions do not attack man unless wounded. Sheep do untold injury by browsing on the short vegetation, nibbling close enough to kill; by destroying the young forest growth, the future dependence for all forest products of value; their sharp hoofs cut out the roots of grasses and grind the soil to dust, which is washed off by rains. In this way untold damage ensues, not only to the forests, but to the farms in the valleys, which depend upon the undergrowth of these forests to retain the water for regularity of distribution.

California's—nay the world's—greatest living prose poet, beloved John Muir, has stated that every great public issue of a similar nature requires about ten years of unswerving devotion from its votaries before it may become an accomplished success. We can wait, therefore, not without hope, for already the sentiment, which first bitterly opposed the work at hand, is changing enough to ensure respectful hearing. I thank you cordially for the support you have given by your attention and sympathy upon this occasion.

Flora of Clifton District, Arizona

BY A. DAVIDSON, M. D.

(Paper read before Section of Botany Oct. 18, 1904)

In due course of time some enterprising botanist will give us, if not a flora, at least a local list, of the plants of Arizona.

Arizona possesses probably the most interesting and varied flora of any state in the Union. Many of its plants are considered rare and local, but this rarity is probably more apparent than real. The greater part of the country is practically unknown to the naturalist and many years must elapse before the work of exploration is even superficially performed.

The lack of facilities for travel and accommodation are the least of the difficulties. The climatic conditions are the deterrent factors. Contrary to the usual belief, Arizona is by no means an arid country. The average rainfall, even in the south, is probably at least seven inches and in the north it is more. The greatest precipitation is normally in the summer time, beginning with the 1st of July and ending the end of August, or middle of September. The winter's snow or rainfall appears in January and December. Thus there are two floras, contingent on the rainfall in spring and autumn. To thoroughly explore any district the same ground would require visiting after each rain, but the summer rains are so unequally distributed that a locality explored one spring might not receive sufficient summer rain for the two or three seasons following.

Last autumn I visited Chase Creek and found it practically destitute of vegetation, while the country ten miles away was a carpet of green. These experiences are common. As you go botanizing in the summer time, with the thermometer around 90 degrees at midnight, you clothe yourself in a silk shirt and a pair of duck trousers and pray for rain, and when it catches you on some rocky slope or treeless plain in the form of a cold, drenching thunderstorm you pray again for warmth. Altogether the conditions are not favorable to good and philosophic work.

As many years are likely to elapse before the country is sufficiently closely explored to give a clear idea of the distribution of its numerous species, any list of plants now published will prove of immense value to future investigators.

In this number I have begun the publication of the plants secured by me in the neighborhood of Clifton. The district covered extends from the New Mexico border near Duncan, twenty-five miles south of Clifton, to the Blue River, a tributary of the Frisco, nearly twenty miles north of Clifton, and

west along Chase Creek for twelve miles. The River Frisco, with its tributaries, traverses the district, as it flows southwards to join the Gila about twelve miles below Clifton.

LIST OF PLANTS.

Anemone sphenophylla Poepp. Clifton. Longfellow. April.

Aquilegia chrysantha Gray. Moist banks Chase Creek and Blue River. May.

Thalictrum Fendleri Eng. var. **Wrightii** Trealease. Metcalf. July.

Clematis Drummondii T. & G. Fairly common. September.

R. cymbalaria Pursh. Gila River at Guthrie. May.

Myosorus minimus L. River at Clifton. May.

Eschscholtzia Mexicana Greene. Common. May.

Corydalis aurea Willd. var. **occidentalis** Eng. Frequent along shaded river banks.

Wislizenia refracta Eng. On the Gila banks at Sheldon. October.

Cleome integrifolia T. & G. Locally abundant in sandy soils. May.

Polanisia trachysperma T. & G. Widely distributed May to October.

ASTRONOMICAL NOTES.

EDITED BY WM. H. KNIGHT.

The new instrument which is being installed on Mount Wilson by Director Hale of the Yerkes Observatory, will be known as the Snow Memorial Telescope, and is the largest of the kind in the world. This is made possible by the liberal contribution of Miss Snow in connection with an appropriation of $13,000 from the Carnegie research fund. In connection with this great instrument there will be spectographs, spectroheliographs, and the finest astronomical apparatus possible to obtain. It is expected that it will be ready for research work in December of this year, and will be used in observing the phenomena of sunspots and solar disturbances during the maximum sunspot year of 1905.

Regarding the possibilities of this research work Professor Hale says: ''The solar observer may be the spectator of physical and chemcial experiments on a scale far transcending any that can ever be performed in a laboratory. In this enormous crucible, (the sun), heated to temperatures greatly exceeding those attainable by artificial means, immense masses of luminous vapor, including most of the elements known on earth and many not yet discovered here, may be seen undergoing changes and transformations well calculated to assist in the explanation of problems which the laboratory cannot solve.''

An important astronomical event is the return of Encke's comet under favorable conditions for observation, similar to those of 1805, 1838, and 1871. It will be at perihelion January 4, 1905. Its nearest approach to the earth will be about 35,000,000 miles, when, early in December, it

may be visible to the naked eye near the star Altair. It will be five degrees north of Beta Pegasi on November 1, its course being westward.

Sir David Gill of the Royal Observatory at Cape Town has determined the parallax of the star Antares as 0.021 sec., making its distance in round numbers one quadrillion miles. From photometric considerations J. E. Gore computes the mass to be 88,000 times that of our sun. "If," says Prof. Edgar Larkin, "its density is equal to that of our sun, the diameter of that stupendous world would be 37,000,000 miles, or about equal to the radius of the planet Mercury."

There is confirmaton of the existence of a ninth satellite revolving around the mighty system of Saturn, far out in space beyond all the satellites of that body hitherto known. It was discovered by the photographic method, by Professor Wm. H. Pickering, with the Bruce 24-inch telescope at Arequipa, Peru. This new moon has been given the name of Phoebe by its discoverer.

ANNOUNCEMENTS FOR OCTOBER-NOVEMBER, 1904.

Many members of the Academy were enabled to enjoy the illustrated lecture of Mr. Alden Sampson at the Woman's Club House, on Friday evening, September 30, through the courtesy of the Friday Morning Club and the local section of the Sierra Club, by whom the invitations were given.

We have also to express thanks to the Ebell Club for their esteemed invitation to the Academy to join with them in welcoming Sir John Murray, who was expected at their meeting on Monday afternoon, October 11. We share their regret at the contretemps which delayed their distinguished guest, depriving all of delectable and profitable entertainment. But later, upon the arrival of Sir John in the city, it became possible to arrange a joint meeting of the Ebell and the Academy at the State Normal School, when the lecturer aroused much enthusiasm by his very interesting and important address upon the subject of "Oceanology."

The Section of Biology met Monday evening, October 10, at the Normal School, the program being varied and of the nature of general discussion upon current topics. These occasions are always profitable to members and others who attend.

The Section of Botany met October 18, 8 p. m., at Room 501, Laughlin Building. Dr. Anstruther Davidson spoke on "The Botany of Arizona," to which he has given particular attention in the field. We are able to give an abstract of his paper in this issue of the Bulletin.

The regular session of the Section of Geology will take place at the Normal School, Monday evening, October 24, when Mr. J. B. Lippincott, supervising engineer of the Reclamation Service of the U. S. Geological Survey, for this district, will outline the work of his division. Nothing can now occur of more general interest or importance to the welfare of this community, and we bespeak for him a large attendance of members and their friends.

The Academy will have a lecture on the evening of November 7, by Dr. Theo. B. Comstock, on the subject: "Wild Nature in the Rocky Mountains, Around and About Yellowstone Park," illustrated by lantern slides, mostly colored. Dr. Comstock was the geologist of Capt. Wm. A. Jones' Expedition in 1873, which discovered four passes not previously recorded on any map, among them two which had been pronounced mythical theretofore. The lecturer has collected a large number of views of remarkable and very little known scenery and natural groups of wild animals, many of which cannot be duplicated.

The several Sections are preparing interesting and profitable programs for November, but we go to press too early to give details in this place.

RECENT LITERATURE.

The Annual Report of the Carnegie Museum, Pittsburgh, for the year ending March 31, 1904, possesses interest to us in Southern California in several ways. First, it shows what can be done by enlightened public spirit assisting and assisted by donations from those who have the good sense to appreciate the prime value of scientific work and museum collections as educational and refining influences. Secondly, it adds to our discredit for the meager accomplishment here, by disclosing the purchase of A. W. Anthony's collection of ten thousand birds of the Pacific Coast, taken out from under the noses of local men of money. But still more, we have let go to this same museum a valuable collection of plants from Southern California, sold by Professor H. M. Hall, of Berkeley. Thirdly, it stands as an example of what opportunity lies open to us, if only we can get together funds enough to make a decent start in conserving what is near to our hands. The experience of the Southwest Society of the Archaeological Institute of America, in simply **pushing** to the front clearly indicates that ripe fruit needs plucking here in Los Angeles, and the harvest awaiting the reapers of the Academy of Sciences is far more abundant than many of us realize. **"Let us then be up and doing." (C.)**

"A Fossil Egg From Arizona" is the title of a paper by Wm. Conger Morgan and Marion Clover Tallman, issued as Bulletin No. 19, Vol. 3, of University of California Publications. The specimen was found embedded in a pebble picked up from gravel on the Gila River. Its age, though not absolutely determinable, was probably as old as the Quaternary (Pleistocene) Period. The markings of the shell and the interior structure are well preserved, and the condition of the contents affords proof of actual transformation of animal tissue into bituminous matter. The bulk of the inner space is filled with the mineral, colemanite, with small patches of a tarry substance closely allied to the petrolene series of natural asphalts. The authors fairly demonstrate the impossibility of external origin of the tarry ingredient. **(C.)**

Bulletin No. 20, Vol. 3, of University of California Publications, is a paper on "Euceratherium, a New Ungulate From the Quaternary Caves of California," by Wm. J. Sinclair and E. L. Furlong. This discovery in places in Shasta county, is interesting to technical students, who will see in it a link in the chain of ancestry of an important group composing the Sheep Family. The name, signifying beautiful-horned wild beast, is taken from the gentle curve of the horns, which are smaller than those of the Bighorn Mountain Sheep, although the head was larger. **(C.)**

"The Useful Properties of Clays," by Allerton S. Cushman, appears as Circular No. 17, Bureau of Chemistry, of the U. S. Department of Agriculture. The intimate relation of clays to progress in civilization, the backwardness of America in the fashioning of works of art and beauty from this material, and the lack of any cause therefor except indifference of the people, are briefly presented. Then follows an explanation of the reasons for the prestige attained by certain potteries and the final passage of celebrated wares into the domain of the lost arts, mainly because of very slight differences in chemical composition of the materials used. Every deposit of clay is a problem by itself and men skilled in the working of one grade may be entirely at a loss how to manipulate another which differs only in minute particulars. The clays of the United States are as diverse and as well adapted to the production of art pottery and fine porcelains as those of Europe; and yet in 1902, 11.5 per cent. in bulk and over 56 per cent. in cost, of all clays used in this country were imported.

Mr. Cushman gives valuable information on varieties, physical properties, treatment, uses and methods of testing. Eighty-eight modes of use are given, on the authority of the U. S. Geological Survey, and the list quoted does not comprise all that might be mentioned. **(C.)**

"Informe Acerca de la Fisiografia, Geologia e Hidrologia de los Alrededores de La Paz, Baja California, por Ernesto Angermann, Dr. Phil." 1904. 26 p. This document forms the first paper of Vol. 1, No. 2, of the Transactions of the Instituto Geologico of Mexico. It contains a map made up from the previous work of Dr. Gustav Eisen, the Instituto Geologico and the imperfect railway maps in the Mexican Official Guide, with corrections and additions by the author. Upon a tracing sheet superimposed the geological terranes are outlined. Interesting facts regarding the topo-

graphic divisions, water supply, etc., of the southern portion of Lower California are given. **(C.)**

"The Southwest Society of the Archaeological Institute of America; Something About Its Aims and Its First Year's Work. Mr. Chas. F. Lummis, tireless worker; faithful, persevering and efficient Secretary of the local branch of this great scientific body; indefatigable, versatile and consistent recorder and elaborator, has, in this illustrated reprint of an article from Out West, entitled "Old Art in America," given the history of the priceless Cabelleria collection of old Mission paintings, now preserved through the efforts of the Southwest Society. The Executive Committee of this young, but virile organization has sent this out as a campaign publication, adding thereto a "Brief Summary" of the first year's work of the Society. The thorough work being done in the phonographic recording and the harmonizing of Indian and Mexican folk-songs, by Messrs. Farwell and Lummis, the vigorous and scientific labors of Dr. F. M. Palmer, the most modest, but most competent of local archaeologists, in collecting and arranging relics of earlier man in this region, and the advanced stage of progress in the plans of the Exeecutive Committee towards the erection of a Museum in Los Angeles; all these and other accomplishments of the Society in much less than one year are grounds for great local pride. But when it is understood that no other branch of the Institute has ever accomplished anything like this amount of work in twice the same time, we are strongly admonished that the Southern California Academy of Sciences must look to its laurels at once. If heretofore, we have not believed enough in ourselves and have been too self-confident of the worth of our aims, let us now pursue a more aggressive policy and compel the attention of those who now neglect their abundant opportunity to put where they rightfully belong the potent factors for good in this community.

The Quarterly issue of the Journal of the Archaeological Institute of America, Vol. VIII, No. 3, is replete with details of discoveries in classical archaeology by the American schools at Athens and Rome, maintained by the Institute, and voluminous discussions of archaeologic questions, besides numerous notes of recent work all over the world. These invaluable records are presented in good form and they add one more to the long list of contributions to archaic science made by this vigorously active organization.

"El Area Cubierta por la Ceniza del Volcan de Santa Maria, Octubre, 1902," by Dr. Emil Boese, is the second paper of Vol. 1, No. 2, of Transactions of Instituto Geologico de Mexico. He scores Dr. Gustav Eisen for remarks regarding the distribution of ash by this volcano in Guatemala in the eruption cited. In the region visited by the author, where Eisen had given the depth from one inch to ten feet, Dr. Boese finds a maximum of less than one foot, and in other places cited as important, the covering varied from traces to considerably less than one-half inch (less than one centimeter.) **(C.)**

"Annals of Carnegie Museum, Pittsburgh." Vol. II, No. 4, August, 1904, contains article No. IX, and an appreciative memorial sketch of John Bell Hatcher, whose death leaves a gap which no other student of vertebrate paleontology can essay to fill. The sketch is by Dr. W. J. Holland, Director of the Museum and Editor of its publications. The bulk of the volume is made up of an exhaustive treatise on **"The Birds of Erie and Presque Isle, Erie County, Pennsylvania,"** by W. E. C. Todd. We cannot give space for a proper review of this important contribution to Science, but may note the strong tone of protest uttered by Mr. Todd against indiscriminate hunting, rather slaughter, of birds, which occurs in his field as in too many other districts in this country.

Mining Magazine, September, 1904. The continuation of the Pacific Coast Miner as a monthly magazine is evidently meeting with favor, if we may judge from the increased advertising patronage in this third number under the new form. The articles are timely reviews by appropriate authorities on subjects interesting to those who cannot digest more technical treatises for lack of time or preliminary training. For busy engineers and others who need access to such technical articles, without leisure or facilities for assorting from the mass of literature published, a very complete mining index is given each month. This, and the able Mining Digest, which constitutes a regular department, furnish just what is required by amateur and professional in order to keep abreast of the world's work in the mining field. The first issue, in July, was excellent, but improvement may be detected in each succeeding output.

(Incorporated March 21, 1902)

CONSTITUTION AND BY-LAWS

(Adopted October 6, 1902)

CONSTITUTION

ARTICLE I.

NAME AND OBJECT.

SECTION 1. The name of this Association shall be Southern California Academy of Sciences.

SEC. 2. The objects of the Academy are:

(1) To promote intercourse among those who are cultivating science; (2) to elicit public interest in the results of technical investigation by the dissemination of correct information relating thereto; (3) the study of local natural features and phenomena; (4) the conservation of material illustrating local phases.

ARTICLE II.

MEMBERSHIP.

SECTION 1. The membership of the Academy shall consist of Active, Affiliated and Corresponding Members, Fellows, Patrons and Honorary Members.

Honorary Members shall be chosen with life tenure, they shall be exempt from the payment of dues and shall receive the publications of the Academy, but shall not be entitled to vote or to hold office.

Active Members and Fellows shall have the right to vote and hold office, subject only to the restrictions imposed by this Constitution, and they may acquire life tenure in their respective classes under the provisions of this Constitution. Patrons and Honorary Members shall be chosen with life tenure, and Corresponding Members may be elected with limited tenure or life tenure at the option of the Board of Directors.

SEC. 2. Any person living in California, south of Latitude 37°, may become an Active Member of the Academy upon subscribing to this Constitution, after formal election as herein prescribed, and due compliance with the By-laws in force at the time of election.

SEC. 3. All duly qualified members, in good standing, of any affiliated local society shall be enrolled as Affiliated Members of the Southern California Academy of Sciences.

SEC. 4. Corresponding Members may be elected (with limited tenure or life tenure) from duly qualified persons, nonresident in Southern California, in the same manner as provided for the election of Active Members of the Academy.

SEC. 5. Fellows shall be chosen from among the Active Members and Affiliated Members of the Academy, as provided in Article III, Section 3, of this Constitution.

SEC. 6. Any person contributing in any one year the sum of Five Hundred Dollars shall be classed as Patron, with all the privileges of a Life Member. Should such patron be at the time a Fellow of the Academy, the status shall become that of Life Fellow.

SEC. 7. Honorary Members may be elected from outside the membership of the Academy, in manner prescribed in Article III, Section 4, of this Constitution.

SEC. 8. Life Members and Life Fellows shall be such as may commute by the payment of Fifty Dollars at one time, which payment shall exempt from all dues thereafter during life, with all privileges appertaining to the class to which the member or fellow then belongs.

ARTICLE III.

ELECTION OF MEMBERS.

SECTION 1. Candidates for Active Membership shall be proposed by two members, in writing, and all such proposals shall be acted upon by the Board of Directors. The names of elected members shall be announced at the first regular meeting of the Academy following election.

SEC. 2. Corresponding Members shall be elected by the Board of Directors. The names of those so elected shall be announced at the first regular meeting of the Academy thereafter.

SEC. 3. Fellows may be elected by the Board of Directors in virtue of their scientific attainments or services. All such elections shall be by ballot and seven affirmative votes shall be necessary to elect. Only Active Members and Affiliated Members shall be eligible for election as Fellows. *Provided, however, that all Active Members enrolled prior to October* 1, 1902, *shall have the option to become Fellows, without formal election, not later than November* 15, 1902, *upon compliance with the other provisions of this Constitution and of the By-laws in force at the date of exercising this option.*

SEC. 4. Honorary members may be elected at the annual meeting of the Academy, by unanimous vote of the members present at said meeting. If the vote be not unanimous, the matter shall be at once referred to the Board of Directors for final action.

ARTICLE IV.

WORKING SECTIONS.

SECTION 1. There may be organized, as occasion warrants, separate working sections, corresponding in scope to individual branches of science. Each section shall elect its own officers

and conduct its scientific work, *per se,* subject to the limitations of the Constitution and By-Laws and the supervision of the Board of Directors. All legislative acts passed by any Section shall be inoperative until formally approved by the Board.

SEC. 2. No Section shall be formed without petition presented at a regular meeting of the Academy, signed by at least five members, of whom not less than three shall be Fellows. Such petition shall be read before the Academy and referred to the Board of Directors for action.

SEC. 3. Upon authorization, as provided in Article IV, Section 2, the President and Secretary of the Academy, as temporary officers of the proposed section, shall call a meeting of members interested and proceed to organize the section in manner following:

1. Calling Meeting to order.
2. Reading of Petition and Minutes relating to same.
3. Signing roll by organizing members.
4. Election of Chairman and Secretary.
5. Formal announcement of organization.

Upon organization, the Section shall adopt a set of By-Laws in no way conflicting with the Constitution and By-Laws of the Academy, which shall thereupon be submitted to the Board of Directors for approval. When so approved and attested by the President and Secretary of the Academy, the Section shall be regarded as fully established on equivalent basis with any and all other Sections of the Academy.

SEC. 4. All members and Fellows of the Academy shall be free to unite with any or all Sections and no Section shall admit to voting privileges any non-member of the Academy.

ARTICLE V.

AFFILIATED SOCIETIES.

SECTION 1. Any local scientific society within the limits prescribed in Article II, Section 2, may enter into affiliation with the Academy, upon the terms and in manner prescribed in the succeeding sections of Article V of this Constitution.

SEC. 2. Application for affiliation must be made by the President and Secretary of the society, upon a blank form authorized by the Board of Directors, giving evidence that the application is made in accordance with the vote of a clear majority of the members of said society, and that the objects and purposes of the society are similar to those of the Academy. Each application must be accompanied with a fee of five dollars.

SEC. 3. Application for affiliation shall first be referred to the Standing Committee on Affiliation, who shall investigate and report to the Board of Directors. Notice of favorable action by the Board shall be given at the first regular meeting of the

Academy thereafter, and such action shall be regarded as final, unless objection be raised by at least two members, when the question shall be at the disposal of the Academy by a vote of not less than two-thirds of all the members present.

Sec. 4. Societies affiliated under the provisions of the three foregoing sections of this Article V, shall contribute annually in advance to the treasury of the Academy a sum equivalent to one dollar for each and every voting member of said affiliated society, whereupon that number of persons shall be enrolled as Affiliated Members of the Academy, with all the privileges of Active Members, except the right to vote and hold office. For each additional member thus enrolled, the sum of one dollar must be paid at the date of enrollment.

ARTICLE VI.

OFFICERS.

Section 1. At the annual meeting of the Academy and at the annual meetings of Sections, there shall be elected a Board of eleven Directors, in manner following:

The Academy shall elect three Fellows to serve as President, Vice President and Secretary of the Academy, respectively, and as many more Directors (from the Active Members or Fellows) as may be required to complete the number of eleven, after allowing one representative from each established Section of the Academy. Each Section shall then elect from among the Fellows thereof, a Chairman, who shall be the accredited representative of the Section on the Board of Directors. But, should any Chairman of a Section be already a member-elect of the Board of Directors, then the Section shall elect another representative on the Board of Directors from its own membership. Provided that the eleven Directors elected by the Academy in May, 1902, shall serve until the expiration of their respective term in 1903.

Sec. 2. The financial and general business transactions of the Academy shall be entrusted to the Board of Directors, who shall have the care and control of all real and personal property and shall receive, disburse and invest all funds of the Academy by drafts drawn on the Treasurer by the President and countersigned by the Secretary.

Sec. 3. At the first meeting of the Board of Directors a Treasurer shall be chosen from the members of the Board, whose duty shall be to receive and disburse all funds of the Academy in accordance with the provisions of this Constitution and the instructions of the Board of Directors.

ARTICLE VII.

ELECTION OF OFFICERS.

Section 1. Annual elections of officers and Directors shall

be held on the date of the annual meetings of the Academy and its Sections in the month of May, by method prescribed in the By-Laws, and the administrative officers shall be installed at the annual meetings of the Academy and Sections in June following. The incoming Board of Directors shall assume control immediately on the adjournment of the June meeting, and the officers-elect of Sections shall be duly installed at the June meetings of their respective Sections.

SEC. 2. Election of officers and Directors of the Academy shall be by ballot, after nominations duly made as herein provided, viz:

Any person entitled to a vote may nominate, in writing, not later than March 30th, one candidate for each position to become vacant. The names of all candidates so nominated shall be duly considered by the Board of Directors, who shall then freely nominate an official ticket, which shall be presented at the April meeting of the Academy, together with such other names as shall have been regularly nominated by not less than ten Active Members and Fellows. The ticket, or tickets, thus announced shall constitute the formal nominations, to which the voting at the May meeting must be confined.

SEC. 3. Nominations and elections of the officers of individual Sections shall be in accord with the By-Laws governing the particular Section at the time.

SEC. 4. A vacancy occurring at any time in the Board of Directors shall be filled by the remaining members thereof for the unexpired term; should, however, such vacancy leave any Section without representation on the Board, the Section thus excluded shall elect one of its own members to serve as Director. Vacancies occurring among the officers of the Academy shall be filled by the Board of Directors from its own number.

SEC. No person shall be eligible for re-election to the office of President within one year after having served two consecutive terms.

SEC. 6. The Chairman of a Section shall be chosen from the Fellows on its membership roll.

ARTICLE VIII.

AMENDMENTS, ETC.

SECTION 1. Alterations of this Constitution, amendments thereof, additions thereto, or repeal of any portion thereof, may be made at any time, by a vote of two-thirds of the Members and Fellows of the Academy; provided, that the changes proposed be presented in writing at a meeting of the Academy, and that the vote be taken at a subsequent meeting, held not less than one month later.

BY-LAWS

ARTICLE I.

MEETINGS.

SECTION 1. Regular meetings of the Academy shall be held on the first Monday evening of each calendar month, except July and August.

SEC. 2. Regular Section meetings may be held monthly, at such times and places as shall be authorized by the Board of Directors, without whose formal consent no change shall be allowed. Special meetings and field meetings may be arranged by the Sections without reference to the Board, but they shall be reported in advance to the General Secretary, for the information of the Board.

SEC. 3. As far as practicable, the Board of Directors shall provide for meetings of the Academy and of the principal Sections at one and the same place.

SEC. 4. Special meetings of the Academy may be called by the President, and shall be called at the request of five members, provided that the particular business to be transacted be stated in the call, and that no other business be consummated at such special meeting.

SEC. 5. Special meetings of any Section may be called by the Chairman thereof, and shall be so called at the request of three members. The special business for said meeting shall be stated in the call, and no other business shall be transacted at said meeting.

SEC. 6. Advice of special meetings of the Academy shall invariably be given to all persons entitled to vote, by written or printed notices, duly mailed, not less than one week in advance of the date thereof.

SEC. 7. Annual meetings of the Academy shall be held in the place of the regular May meeting of each year.

ARTICLE II.

ORDER OF BUSINESS.

SECTION 1. The order of procedure at regular meetings of the Academy shall be:

1. Minutes of preceding meeting.
2. Report of Board of Directors.
3. Report of Committees.
4. (Special business.)
5. Unfinished business.
6. New business.
7. *Program for the Meeting, with discussions.*
8. Adjournment.

SEC. 2. At regular meetings of Sections the order of procedure shall be:

1. Minutes of preceding meeting.
2. Business of the Section.
3. *Presentation and Discussion of Papers.*
4. Enrollment of Members.
5. Adjournment.

SEC. 3. At each June meeting of the Academy the order of procedure shall be:

1. Brief statement of Plan and Scope of the Academy by the President.
2. Annual Reports of Secretary and Treasurer.
3. Announcement of donations.
4. Election of Honorary Members.
5. Necrology.
6. Program prepared by the Board of Directors, including installation of President elect and incoming officers.
7. Address by retiring President.
8. Dismissal by President-elect.

ARTICLE III.

QUORUM, ETC.

SECTION 1. Fifteen members shall constitute a quorum for the transaction of business at regular and special meetings of the Academy, provided that not less than five Fellows be included.

SEC. 2. Five members present shall constitute a quorum of the Board of directors for the transaction of business not otherwise restricted by the Constitution.

ARTICLE IV.

COMMITTEES.

SECTION 1. There shall be the following Standing Committees of the Board of Directors:

1. Committee on Publication.
2. Committee on Finance.
3. Committee on Membership.
4. Committee on Affiliation.

SEC. 2. The Committee on Publication shall supervise all publications of the Academy, subject to the control of the Board of Directors. No paper shall be published until after being read, in person or by title, before the Academy or one of its Sections. The Chairman of the Publication Committee shall be the Editor of the Bulletin and other regular publications issued under the authority of the Academy.

SEC. 3. The Committee on Finance shall act in an advisory capacity on matters affecting the appropriation and expenditure of funds and the application of grants, donations and bequests, and its members shall also perform the duties of an Auditing Committee, reporting at the Annual Meeting of the Academy upon the condition of the books of the Treasurer.

SEC. 4. The Committee on Membership shall be charged with the duty of enlisting suitable members by all appropriate means.

SEC. 5. The Committee on Affiliation shall investigate all applications for affiliation and report to the Board of Directors before final action thereon. It shall be the duty of the Committee to co-operate with the President in appropriate efforts to extend the influence of the Academy among local societies, and to induce such bodies to become affiliated with the Academy.

SEC. 6. There shall be a Standing Committee on Program, to consist of the President and the Chairmen of all the Sections, whose duty it shall be to arrange suitable programs for all regular meetings of the Academy, under such regulations as may be prescribed by the Board of Directors.

ARTICLE V.

DUES AND FEES.

SECTION 1. Each active member, upon election, shall pay an initiation fee of One Dollar.

SEC. 2. Each active member, upon changing status to Fellow, shall pay a Fellowship fee of One Dollar.

SEC. 3. Annual dues of Active Members and Fellows, shall be Three Dollars, payable January 1st, in each year.

SEC. 4. Special dues assessed by any Section, in addition to the established dues of the Academy, shall not exceed One Dollar per annum. All such dues shall be covered into the Treasury of the Academy and applied solely to the current expenses of the individual section, unless otherwise especially authorized by the Board of Directors.

ARTICLE VI.

ELECTION OF OFFICERS.

SECTION 1. On the day of the annual meeting, polls shall be established as near as may be to the regular meeting place of the Academy, which polls shall be open not less than two hours prior to the hour set for the meeting. The President shall appoint three judges of election to supervise the voting and three tellers to count the votes. All these appointees must be selected from without the Board of Directors, and no person who is a candidate for any office at such election shall be eligible as judge or teller aforesaid.

ARTICLE VII.

ADOPTION OF BY-LAWS AND AMENDMENTS THERETO.

SECTION 1. By-Laws for the further regulation of the Society may, from time to time, be made, and any By-Law or portion thereof, may be temporarily suspended by vote taken at a regular meeting of the Academy, two-thirds of the members present concurring; but such act shall not be operative unless the names of ten Fellows present are recorded in the affirmative.

List of Members

HONORARY MEMBERS.

Coleman, S. E. .... Oakland, Cal.
McClatchie, Professor A. J. ....
Montgomery. J. J. .... Santa Clara, Cal.
Parish, S. B. .... San Bernardino, Cal.
Swift, Lewis, Ph. D. ....

LIFE MEMBERS AND FELLOWS.

(Fellows are designated by the sign *).

*Comstock, Dr. Theo. B. .... Stimson Bldg.
*Hendryx, W. A. .... Douglas Bldg.
*Hooker, J. D. .... 325 W. Adams St.
*Watts, W. L. .... 146 W. 28th St.

ACTIVE MEMBERS AND FELLOWS.

Adams, A. G. .... 906 W. 7th St.
Allin, T. D. .... Pasadena
*Arnold, Paul .... 1111 South Hope St.
Avery, Wm. H. .... Laughlin Bldg.
*Bailey, Dr. C. A. .... 10th St. and Flower
Baker, Professor C. T. .... Claremont
Bannister, L. H. .... Station A, Pasadena
Barlow, Dr. W. Jarvis .... Wilcox Bldg.
Barnum, Dr. O. S. .... Stimson Bldg.
Barrows, H. P. .... Ontario
*Baumgardt, B. R. .... 116 N. Broadway
Baverstock, Ralph S. .... 322 W. First St.
Beals, Professor Frederick H. .... 615 W. 5th St.
Behrens, H. A. .... Conservative Life Bldg.
Behrens, R. H. .... Conservative Life Bldg.
Behymer, L. H. .... Mason Opera House
Benton, Arthur B. .... 114 N. Spring St.
Berman, Mrs. R. .... 1689 W. Adams St.
*Bishop, Dr. H. M. .... 2627 Hoover St.
*Bobrick, G. A. .... 727 San Fernando St.
*Boothe, Chas. B. .... 824 Bonnie Brae St.
*Borden, Gail .... 508 Laughlin Bldg.
Boyle, J. L. .... 507 Carondolet St.
*Brackett, Professor F. P. .... Pomona College, Claremont
*Bridge, Dr. Norman .... 217 S. Broadway
Brigham, Olivia S. .... 401 Court St.
Brittain, E. A. .... 417 W. 7th St.
Brown, Frederick L. .... Garvanza
*Bullard, Dr. F. D. .... Bradbury Bldg.
Burcham, Mrs. C. A. .... 700 Burlington Ave.
Burns, Dr. Louisa .... S. Pasadena
*Butterworth, W. A. .... Pasadena
*Cady, Dr. Jessie A. .... 10th and Flower Sts.
*Callahan, C. J. .... 127 N. Main St.
*Canfield, Wm. J. .... Johnson Bldg.
Chamberlain, Professor A. H. .... Throop Inst., Pasadena
*Chamberlain, J. F. .... Normal School
Chandler, Harry .... Times-Mirror Co.
Chapin, Dr. A. R. .... Altadena
Chase, Lucius K. .... Laughlin Bldg.
Cheney, Hon. W. A. .... Stimson Bldg.
Cheney, H. D. .... Stimson Bldg.
Clark, J. M. .... 152 Lake Ave., Pasadena
*Claypole, Dr. Edith J. .... Pasadena

Cole, Dr. Geo. L. . . . . 1425 S. Hope St.
Coleman, S. E. . . . . Oakland
Collins, H. O. . . . . Henne Bldg.
Colwell, W. A. . . . . 105 W. 5th St.
Comer, J. A. . . . . Laughlin Bldg.
Conaty, Rt. Rev. Thomas J. . . . . 717 S. Burlington Ave.
Conrad, Dr. A. C. . . . . 454 S. Spring St.
Cook, J. A. . . . . Currier Bldg.
Cooper, Alice G. . . . . 202 W. 27th St.
Crosswell, Profesor T. R. . . . . Normal School
Crow, Geo. R. . . . . Conservative Life Bldg.
Crow, Dr. Louise P. . . . . 676 Westlake Ave.
Cunningham, D. W. . . . . 627 W. 18th St.
Cuzner, James . . . . California Club
*Davidson, Dr. Anstruther . . . . Laughlin Bldg.
*Davis, Dr. H. J. . . . . 2 Chester Place
*Dozier, Professor Melville . . . . State Normal School
Durand, D. L. . . . . 509 W. 23d St.
Eddy, J. W. . . . . Bryson Bldg.
Elliott, J. M. . . . . First National Bank
Emery, Dr. R. D. . . . . 10th and Flower Sts.
Fargo, Dr. J. F. . . . . 139 W. Adams St.
*Fellows, Dr. Alfred . . . . 929 S. Main St.
Fishburn, J. E. . . . . 2827 Menlo Ave.
*Fletcher, Charles R. . . . . Hotel Lovejoy
Fletcher, W. H. . . . . 312 Westlake Ave.
Follansbee, Dr. E. A. . . . . Laughlin Bldg.
*Foshay, Professor J. A. . . . . Chamber of Commerce
French, John B. . . . . Pomona
Gardner, Ellen M. . . . . 717 Burlington Ave.
Gardner, Mrs. J. W. . . . . 717 Burlington Ave.
Gamber, Dr. B. F. . . . . Johnson Bldg.
Germain, Eugene . . . . 953 S. Hope St.
*Goodwin, O. H. . . . . 321 W. Ave. 37
Gordon, Dr. F. . . . . Braly Bldg.
Gregory, Professor Lyman . . . . High School
Hahn, Anna . . . . 743 S. Hill St.
Hardison, W. L. . . . . Tajo Bldg.
Harriman, George . . . . 2144 Flower St.
Hartley, Mary M. . . . . 1350 Constance St.
Harrison, Arthur W. . . . . 330 W. 30th St.
Hasse, Dr. H. E. . . . . Soldiers' Home
*Haynes, Dr. John R. . . . . 945 Figueroa St.
Hecht, Rabbi S., D. D. . . . . 817 Beacon St.
Houghton, Dr. Arthur D. . . . . 417 W. 29th St.
Howe, F. A. . . . . 1513 Millard Ave.
*Hoyt, A. S. . . . . Pasadena

*Hughes, Dr. West............................500 W. 23d St.
*Hunt, Dr. J. C..................................Grant Bldg.
Hunter, Elmer S.........................334 S. Figueroa St.
James, Geo. Wharton.............................Pasadena
Jevne, H...............................849 S. Burlington Ave.
Johnson, A. Campbell.............................Garvanza
Johnson, Rt. Rev. J. H.......................523 S. Olive St.
*Johnson, Dr. J. H............................814 W. 7th St.
Jones, F. D....................................226 W. 1st St.
Jones, Mary..................................Public Library
Jones, W. M..................................721 W. 23d St.
Kearney, Dr. Elizabeth F................2109 Estrella Ave.
Keese, Samuel J...............................Trust Bldg.
Kerckhoff, H. H..............................638 Maple Ave.
*Kinney, Abbot................................Stimson Bldg.
*Knight, Wm. H...............................1012 W. 8th St.
Koebig, Dr. A. H..............................Stimson Bldg.
*Larkin, Professor E. L............................Mt. Lowe
Laughlin, Homer, Jr.........................315 S. Broadway
*Lee, Dr. J. M..............................723 Coronado St.
Leslie, Professor Geo. P.......................High School
Loeber, Jacob..............................326 S. Broadway
*Low, A. H...................................1417 Hoover St.
Low, T. C....................................1417 Hoover St.
Lowe, Professor T. S. C...........................Pasadena
Mabury, Wm.................................1008 Diamond St.
*Macleish, Dr. A. L...........................Bradbury Bldg.
*Macleod, Malcolm.........................600 S. Alvarado St.
McBride, Dr. J. A.................................Pasadena
*McClelland, Professor E. S................Occidental College
McConville, J. B............................Lankershim Bldg.
*Mattison, Dr. F. C. E............................Pasadena
Maude, F. Homer..........................1720 Brooklyn Ave.
Miller, Charles M..........................512 S. Boyle Ave.
Millspaugh, President J. F...............State Normal School
Mohr, Paul F...................................Byrne Bldg.
Moody, Charles Amadon......................115 S. Broadway
*Moody, Dr. J. D............................Laughlin Bldg.
*Moody, Mrs. R. O..............................San Francisco
Moore, Lester...................................Tajo Bldg.
*Nevin, Dr. J. C..............................1319 Santee St.
Palmer, Professor Elizabeth....................High School
Parker, O. K....................................Braly Bldg.
Parkhurst, Dr. Burleigh.......................Douglas Bldg.
*Parsons, Geo. W...........................107 S. Broadway
*Patterson, W. C..................Los Angeles National Bank
Payne, Theodore............................440 S. Broadway

Perkins, Professor H. B. . . . . Pasadena
Petter, A. J. . . . . 226 S. Olive St.
*Phinney, Dr. Carl H. 10th and Flower Sts.
Pierce, E. F. . . . . 125 W. Second St.
Preston, M. B. . . . . 412 S. Hope St.
Randall, Professor Wm. T. . . . . Ione
*Rendall, Mrs. T. A. . . . . 905 S. Alvarado St.
*Rice, Paran F . . . . Stimson Bldg.
Riversoll, Elfigo . . . . 525 Laughlin Bldg.
Robinson, R. D. . . . . 1103 W. 30th St.
Robinson, Rev. George . . . . 523 S. Olive St.
*Rogers, Dr. James R. . . . . Byrne Bldg.
Russell, Colton . . . . 3148 Kingsley St.
Schaefle, W. J. . . . . 218 W. 6th St.
Seymour, Miss C. M. . . . . 746 W. Adams St.
Solano, Alfred . . . . 226 S. Spring St.
Spaulding, W. A. . . . . 322 Wilcox Bldg.
Stabler, L. J. . . . . 1122 W. 30th St.
Stewart, John . . . . 1417 E. 21st St.
Sweet, Mrs. S. M. . . . . 121½ S. Broadway
*Taber, G. Major . . . . Laughlin Bldg.
*Tasker, Dr. D. L. . . . . Grant Bldg.
Toll, Mrs. Eleanor Joy . . . . 1941 S. Union Ave.
Travelyan, G. Hamilton . . . . 1435 W. 23d St.
*Ulrey, Professor A. B. . . . . 1435 W. 23d St.
Variel, R. H. F. . . . . 302 Tajo Bldg.
*Vischer, Dr. L. G. . . . . Laughlin Bldg.
Vosburg, G. N. . . . . 1242 Westlake Ave.
Vosburg, John S. . . . . 1012 Bonnie Brae St.
*Wade, E. M. . . . . 318 E. 1st St.
*Wadsworth, President Guy W. . . . . Occidental College
Wadsworth, T. S. . . . . Douglas Bldg.
Walker, Rev. H. K., D. D. . . . . 1718 S. Flower St.
Washburn, W. J. . . . . 1st and Broadway
Wheeler, Mrs. S. A. P. . . . . San Gabriel
*Whiting, Dr. C. A. . . . . Pacific College of Osteopathy
Wigmore, Mrs. John . . . . 949 W. Adams St.
Wilson, W. H. . . . . 410 E. 3d St.
Winter, F. C. . . . .
Wood, R. J. C. . . . . 1926 S. Grand Ave.
*Woodbridge, Dr. S. M. . . . . South Pasadena
*Woodbridge, John, D. D. . . . . South Pasadena
Woollacott, H. J. . . . . 1006 S. Hope St.
Wright, B. F. . . . . 1812 Winfield St.
Yates, Wm. . . . . 153 W. 22d St.

BOARD OF DIRECTORS, 1904-1905.

Professor Melville Dozier, President.

John D. Hooker, Vice President.

B. R. Baumgardt, Secretary.

G. Major Taber, Treasurer.

Wm. H. Knight, Chairman Section of Astronomy.

Dr. Anstruther Davidson, Chairman Section of Botany.

Professor A. B. Ulrey, Chairman Section of Biology.

George W. Parsons, Chairman Section of Geology.

Dr. S. M. Woodbridge, Chairman Section of Agricul. Chem.

Dr. Theo. B. Comstock.

Dr. C. A. Whiting.

Standing Committees.

Program—Ex-officio, Dozier, Knight, Davidson, Ulrey, Parsons, Woodbridge, Baumgardt.

Publication—Comstock, Davidson, Knight.

Finance—Parsons, Whiting, Hooker.

Membership—Taber, Woodbridge, Baumgardt.

Affiliation—Knight, Ulrey, Davidson.

Secretaries of Sections.

Astronomy—Professor Melville Dozier.

Botany—Colton Russell.

Biology—Dr. C. A. Whiting.

Geology—G. Major Taber.

Agricultural Chemistry—E. M. Wade.

Meetings, (Every month except July and August.)

Academy, General, First Monday.

Section of Biology, Second Monday.

Section of Astronomy, Third Monday.

Section of Geology, Fourth Monday.

Section of Ag'l. Chem.,
Section of Botany, } as arranged.*

All regular meetings of Academy and Sections are held at the State Normal School, West Fifth and Grand avenue.

Secretary's Office—116 N. Broadway.

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*At present these two Sections meet at offices of their respective Chairmen. Section of Botany, Third Tuesday Evening, each month.

VOL. III. NOVEMBER, 1904 NO. 8

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION

THEO. B. COMSTOCK, S. D.; A. DAVIDSON, C. M., M. D.; WM. H. KNIGHT.

CONTENTS:

PUBLISHED BY

THE ACADEMY, MONTHLY EXCEPT

JULY, AUGUST AND SEPTEMBER

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MAILED DECEMBER 7, 1904

This Means You!

Don't put this aside until you have accomplished something in the way of adding to the membership. There is no organization which fills the place of the Southern California Academy of Sciences. It provides a course of forty high class lectures, each year, with ample opportunity of publishing much valuable literature, besides preserving the work of local investigators. It will not keep down and it will continue to prosper in spite of any fate or any degree of meager support. But it deserves well at your hands and your best interest lies in upholding its work. **Act now and do not forget.**

THANKS TO THE EBELL

The joint meeting of the Los Angeles Ebell and the Academy was a great success, owing to the goodness and self-sacrifice of the ladies of the Ebell. Disappointed by the tardy arrival of Sir John Murray's belated train, they were unable to meet the distinguished guest in their own hall, as previously arranged, and they generously united with the Academy, transferring to it a goodly share of the honors, while themselves sharing most heavily in the expense and providing the larger portion of the audience.

TRANSACTIONS FOR OCTOBER, 1904

I. ACADEMY SESSIONS.

1. Regular Monthly Meeting.

The second meeting of the Academy for the fiscal year was held at the State Normal School, Monday evening, October 3, 1904. President Melville Dozier in the chair.

In fitting words of commendation of the Government work towards the preservation of the wild animals now being ruthlessly slaughtered in American forests, and more especially the effective service rendered by the gentleman introduced, President Dozier presented the speaker of the occasion, Mr. Alden Sampson, formerly game preserve expert of the Bureau of Forestry of the United States Department of Agriculture.

Mr. Sampson read a most valuable paper on the "Present and Prospective Game Preserves of the United States, "showing how incidental to other contemplated objects have heretofore been the refuges vouchsafed to the noble game which reckless slaughter has wofully decimated almost to extinction of some species, as the buffalo, grizzly bear, elk, moose, etc." The present anomalous and ineffective policy of the Government, due to the lack of segregation of authority, was briefly stated and a clear notion was given of the work already accomplished, as viewed by the speaker in a journey of 13,000 miles while inspecting the refuges in actual operation.

This paper was highly appreciated by the audience, as was evinced by a warm vote of thanks tendered the speaker at the close. Some discussion was participated in by President Dozier and Messrs. Collins, Stewart, Knight, Taber, Comstock and others.

The secretary pro tem. announced the list of new members elected by the Board, after which the president made announcements regarding meetings of Sections and the Academy in November, making also a strong appeal to the members to aid in extending the influence of the Academy by personal effort.

An invitation from the Ebell Club to members of the Academy to attend the lecture of Sir John Murray, of Challenger fame, to be given Monday evening, October 10, was read by the president and formally accepted.

The Session was then adjourned to meet again Monday evening, November 7. THEO. B. COMSTOCK, Secretary Pro Tem.

2. Extraordinary Meeting.

The regular monthly meeting of the Section of Astronomy gave place October 17 to a gathering of the Academy in association with the Los Angeles Ebell Club. at the Normal School, to listen to a lecture by Sir John Murray, of Edinburgh, upon "Oceanology." An audience of 800 of our leading citizens listened attentively to this able and interesting address. President Dozier, of the Academy, presided. The distinguished lecturer spoke feelingly and in an entertaining manner of the work of the Challenger Expedition of 1872, and of dredging enterprises under the auspices of other governments than his own, particularly of those conducted by Americans, including that now engaged in the South Pacific under our esteemed Alexander Agassiz. The conclusions reached by authorities regarding the topography of the ocean beds and the nature of the deposits accumulating

thereon were clearly outlined, with remarks indicating the speaker's deductions from known facts.

The cordial thanks of the Academy are due the many members of the Ebell who were present, and we trust that they may not be averse to meeting often with us in our own sessions.

An outline of Sir John's address is given elsewhere in this issue of the Bulletin. B. R. BAUMGARDT, Secretary.

II. DIRECTORS' MEETING.

The Board met at the State Normal School, Monday, October 3, 1904, at 7:30 p. m. Present: President Dozier, Messrs. Knight, Davidson, Whiting, Woodbridge, Taber, Comstock, the latter acting as secretary in absence of Mr. Baumgardt from the city.

The resignation of Mr. S. G. Bennett, U. S. Geological Survey, now residing in San Francisco, was regretfully accepted at his own request on account of removal.

Bill of Baumgardt Publishing Company for printing, postage on Bulletins, etc., amounting to $3.50, was approved and ordered paid.

Members elected in due form:

President J. F. Millspaugh, Professors Frederick H. Beals, Charles M. Miller and F. A. Hull, of the State Normal School; Mr. Elmer S. Hunter, 334 South Figueroa street, and Mr. W. H. Fletcher, 312 Westlake avenue.

After considerable discussion relatinbg to proposed changes in the Constitution or By-Laws, as regards annual dues and membership fees, the Board, in a vote, expressed its approval of the reduction of annual dues to $2.00 per annum, beginning January 1, 1905, and abolition of membership (initiation) fee. Mr. Comstock was directed to report at next meeting of Board whether this will require an amendment to the Constitution or a change of the By-Laws.

The Publication Committee, by Comstock, chairman, reported that the Constitution and By-Laws, Reports of Officers and other official matter, with list of members, as ordered printed by the Board, will require twenty-four pages for the October issue of the Bulletin, and authority was asked to issue a double number of thirty-two pages in order to include other important matter in hand. This action was unanimously approved and a resolution was passed that 1,000 copies of this issue of the Bulletin be printed for use as a campaign document in securing members.

Much discussion was had regarding the best means of enlarging the usefulness of the Academy and the increase of its membership.

Adjournment followed.

THEO. B. COMSTOCK, Secretary Pro Tem.

III. MEETINGS OF SECTIONS.

1. Section of Biology.

The regular meeting, October 10, was called to order by the chairman, who gave a general outline of the proposed work of the Section for the current year.

Minutes of last meeting read and approved. C. A. Whiting made a brief report on the structure and function of the **cauda equina**. The point which the speaker attempted to make was that the lumbar enlargement of the cord represents about thirteen segments. Considerable discussion followed.

A. B. Ulrey made a most interesting report on some pond organisms which he collected in Westlake Park. He carefully described

many of the life processes in these organisms. The whole report was intended as an introduction to somewhat more technical work which is to be presented at the next meeting of the Section, November 14. The paper was discussed at length by several members.

About eighteen members were present.

Mr. Knight, chairman of the Section of Astronomy; Mr. Tabor, secretary of the Section of Geology, and the chairman of this Section, Mr. Ulrey, announced the subjects of lectures for October and the Academy meeting in November.

The meeting then adjourned.

C. A. WHITING, Secretary.

2. Section of Astronomy.

(As previously stated, no meeting of this Section was held in October, owing to the extraordinary meeting of the Ebell and the Academy, which was substituted therefor. Mr. Baumgardt's report of his visit to the International Congress at St. Louis, as a delegate from the Academy, has consequently been postponed to November 21.)

3. Section of Geology.

Regular monthly meeting held at State Normal School, Monday, October 24, 8 p. m. Chairman Parsons being absent, Dr. Theo B. Comstock presided.

A brief paper, entitled "Fossil Peak, Catalina Island," by Blanche Trask, was read by the chairman. Title of paper by Dr. Theo. B. Comstock was announced, "Notes on Structural Materials in Southern California."*

Mr. J. B. Lippincott, Supervising Engineer of the Reclamation Service of the U. S. Geological Survey, for this district, was then introduced and gave a very interesting account of the plans for irrigation of the arid lands in California and Arizona from the waters of the Colorado River, known as the Yuma project. A very lucid explanation followed of the classification adopted in order to properly carry out the work. This being now, in his opinion, somewhat complicated and liable to interference of authority, he recommended a businesslike rearrangement of the general plan of administration. Valuable statistics and some details regarding various projects under way were concisely presented and illustrated by blackboard sketches.

After the address a number of questions put by members were answered satisfactorily.

Professor Dozier, president of the Academy, made a strong plea for greater interest among members, when announcing the subject of the lecture for the next meeting, November 7.

Adjourned to Monday evening, November 28.

4. Section of Botany.

This Section met at 501 Laughlin Building, the chairman in the chair. Dr. A. Davidson read a paper on the "Flora of Clifton, Arizona." A number of specimens of the Malvaceae were shown, one of which was new to the United States.

COLTON RUSSELL. Secretary.

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*This paper is crowded out of the Bulletin this month.

Oceanology*

BY SIR JOHN MURRAY, K. C. B , EDINBURGH, SCOTLAND.

(Abstract of Lecture before the Academy and the Los Angeles Ebell, October 17, 1904.)

The ocean was long regarded as unconquerable by man. The poet, Byron, expressed this sentiment when he wrote:

''Ten thousand fleets sweep over thee in vain;
Man marks the earth with ruin—his control stops
with the shore.''

And yet man has not been content to admit his lack of mastery over even this mighty power in nature. So completely has the science of marine engineering overcome the obstacles of the deep that I think we may safely claim that vessels are now afloat capable of resisting the onset of any storm which can occur at sea.

The methods of study are probably familiar to many of you, but some will be interested by a brief description of the work of an expedition and the means adopted to secure accurate evidence for the upbuilding of a science of oceanology. The principal observations include: soundings to determine depth over the ocean bed, from which to construct maps of its topography; the recording of temperatures at varying depths; the collection of samples of mud by dredging over the floor of the ocean, and the gathering of animate forms for purposes of study of the effect of pressure, temperature and other conditions of environment.

For each and all of these, instruments have been constructed which are well adapted to their uses. Soundings are taken with light strong wire or with hempen rope, at the end of which are attached sinkers, sometimes of three or four hundred weight, surrounding a heavy iron tube in which is placed a registering thermometer, and a greased cup for getting mud from the sea bottom. Usually a registering pressure gauge is also provided, and a water bottle designed to collect from the lowest stratum. Bottom dredging is performed in a different manner. The line is played out for several miles from the rapidly moving steamer, so that it does not settle deeply, then it is allowed to drop gradually to the ocean floor and is dragged slowly to scrape up mud and such life as may there exist.

The maximum depth of the ocean, which is really local and near the new possessions of the United States, in the Indian Ocean, is less than six miles. About five miles is the greatest

*The editor of the Bulletin regrets that he has been unable to submit either the proof or the MS. of this abstract to the lecturer. Believing that he has quoted accurately as to principles, nevertheless, this responsibility rests wholly with the editor.

depth over a considerable area, this also in the Indian Ocean and the Pacific south and north of the equator. Excluding cones, buried or but little above the surface of the water, the average depth of the whole ocean bed is but little more than 18,000 feet.

The results of ocean exploration are numerous and interesting, but there is only time now to go briefly over them. If we leave out of account the local effects of inflowing rivers and the changes induced by living agents along the coast and the borders of islands and more or less submerged cones—i. e., excluding the shallow water areas—there is not much divergence in the composition of sea water. And the same holds good with respect to depth as well as latitude and longitude. That is to say, however much the water of the ocean may vary, from point to point, in temperature, pressure or otherwise, it has about the same chemical ingredients, although there may be differences in density.

At the surface of the ocean plant-life is far more abundant than at any point on land. Within 600 feet of the surface, plant life is profuse but not below that depth, which is the limit of light penetration. At deeper levels, down to the maximum depth of the floor, animal life exists, and this is fairly prolific at the very bottom. All the animals there are of the type of mud-grubbers and many of them are provided with organs especially adapted to their environment, very different from those living where light abounds. One form has phosphorescent light at the tips of its tentacles, another has a protruding eye-like organ which glows at the end, furnishing a light which it can direct at will over a wide field. Eyes show a gradual change in various forms at different depths, and they are absent in many deep sea animals.

The light which enables the animals to see at great depths is undoubtedly phosphorescent. This source of illumination is common at the ocean's surface, as you must have observed frequently on your own sea-coast. In mid-ocean the waves in the wake of a moving vessel exhibit it brilliantly at night. We were frequently able to read fine print by its aid alone on the deck of the Challenger, fifteen feet above the water.

My own views, I must admit, have not been fully accepted by all geologists, but I am well convinced that the former general belief that limestones are mainly detrital will not hold for the deposits in mid-ocean. I strongly incline to the opinion that all true limestones not made up of cemented aggregates of shells, have passed through living organisms. In the deep sea, the animals work over the mud, extracting the organic matter and rejecting the limy fragments of shells. Coral build-

ing organisms secrete lime-rock within their own tissues.

One point of great importance to geologists is the distribution of deposits of phosphates and glauconite. We do not find any of these now forming, except along the coasts in peculiar situations. They are invariably in localities where cold currents may, at intervals, rush in to warmer zones of the sea, destroying much of its life. Thus, off the coast of Canada and the northeastern portion of the United States, we have the report from the Fish Commissioners that untold millions of fish and other denizens of the ocean were killed in a stormy period. Their remains formed a layer several feet in thickness in parts of the tract. From their decay and by processes well enough understood beds of phosphate are built up, and in connection therewith glauconite is also formed.

Thus is explained the location of such deposits in Florida, at the Cape of Good Hope, in Algiers and elsewhere, always near the coast borders, representing areas of former shallow submergence. Something of the same action is also taking place along the North Pacific coast, in Canada and the United States, and I presume that beds of glauconite and phosphate are there to be found.

The deposition of sand grains is now known to be confined almost wholly to degradation of land surface. There is practically no accumulation of silica in the deep sea, except in regions where melting icebergs drop the material which they have transported from the land. Diatoms and other organisms with siliceous parts thrive in many parts of the ocean, even away from the areas of detrital deposit. The explanation of some of these facts is still obscure.

Contrary to general belief heretofore, there is no evidence of convection currents in the deeper layers of the water. Below 600 feet in depth, both light and heat are independent of atmospheric influences. Not more than one degree of difference in temperature, upon the average, is discernible in very deep water over the whole area of the oceans.

The old idea of geologists that the oscillations of the continental areas have had their counterpart in changes of the great base-level plateau underneath the ocean, do not appear to be warranted by the discoveries of oceanologists. They tend rather to show that the continents have grown independently and that they are now growing by a process of hydration. This means the absorption of water from the ocean, producing earth masses of less specific gravity than the covered portions on the basal plateau. This view explains the known difference of action of the pendulum over the land and in mid-sea, and gives me reason to conclude that the continents are grow-

ing at the expense of the sea. It would then appear that the main cause of land movements is pressure from the sea.

The pressure at great depth in the ocean is, of course, very great, amounting to more than 800 pounds per square inch at five miles. But the differences in water at the surface and on the bottom are not as much as might be supposed. This arises from the very great resistance of water to compression. If the action of gravity were to cease, the surface of the ocean would rise only about 200 feet. The great pressure is manifested in all directions, and sometimes thermometer bulbs are smashed to dust where not sufficiently protected in sounding. Adequate provision must be made against this enormous pressure, both to prevent what oceanologists call "implosion," as in the case cited, and explosion by outward bursting of water bottles; for instance, by expansion on reaching the surface, through excessive diminution of pressure.

The water at the bottom of the ocean where it is very deep is extremely cold, even at the troipcs, there being very little difference in temperature at different latitudes. The mud brought up in the dredge is cold enough to be used as ice in cooling bottled beverages.

The ocean floor is covered with a deposit made up of fragments of shells, of vegetable detritus and other fine-grianed material such as may drop from the rich life-zone of the first 600 feet from surface. There are also commonly found minute spherules, of the size of a pin head, say not more than six or eight to a pint of mud, which have centers of dense metallic iron. These are undoubtedly of meteoric origin, apparently contributed from sources outside our own planet. My observations and other records all go to show that there is no such thing as a continuous shower of cosmic dust over the oceans.

The limits of my time and the lack of illustrative material at hand, as well as the audience before me, forbid more than these broad generalizations here. Much as we have learned, there remain many questions to solve of great interest and of far-reaching importance. Some of these must have great influence upon the future development of geographic and geological science. I thank you for your attention and the interest you have shown in this work.

Dr. Herman L. Fairchild, of the Rochester (N. Y.) University, has brought out a new edition of Dana's Manual of Geology, revised in accordance with the new conceptions as put forth by Professor Chamberlin. Those who accept these principles have faith that their influence upon the science of geology will be as far reaching and as stimulative as were the promulgations of Darwin's and Spencer's tenets in the field of Biology.

Work of the United States Reclamation Service in California

BY J. B. LIPPINCOTT, Supervising Engineer.

(Read Before the Section of Geology, Oct. 24, 1904.)

There is anomaly in the classification of the Government work as relates to the administration of certain departments. The resulting complications have caused less practical duplication of work than would have occurred otherwise, because the defects of the system are very well appreciated upon all sides.

The United States Geological Survey has been given charge of that portion of the study and construction which relates to the utilization of the nation's water supply for the benefit of the greatest possible number of inhabitants. Briefly stated, the plan of operations in each irrigation district is as follows:

When the actual owners of the land have accomplished the proper organization of an association for water distribution under conditions now clearly established by law, the Government formally agrees to build and operate suitable headgates without charge for taxes or interest. The original cost must, however, be paid back to the Government by the users, in such annual charges for the water as may be necessary to liquidate the total sum in a long series of years. The national Government contracts directly with the local association, but it is stipulated that from 40 to 160 acres shall be the maximum allowance for each land owner and that shareholders shall be land holders only, at one share per acre.

Under these requirements of law, already a large amount of work has been undertaken. Each district is in general charge of a supervising engineer, with an adequate corps of engineers, assistant engineers and other employes. These gather the necessary information and submit projects which are carefully scrutinzed by a board of six consulting engineers.

The California District extends from Central Oregon to and including the Colorado River. Work is now well advanced in this large area upon four projects of importance, which together are estimated to contain sufficient water, properly conserved, to irrigate considerably more than half a million acres of land accessible therefrom.

Below are given brief outlines of the work thus far undertaken in this California District under my supervision:

Klamath Project.—Klamath River, outlet of Klamath Lake, Oregon, with large swamp areas, feeding by overflow process

into Little Klamath Lake (Oregon-California); thence southwestward through Siskiyou, Humboldt and Del Norte counties, California, to the Pacific Ocean. Irrigation is here essential. The lands are flat, the soil fertile, sandy loam, probably capable of economical irrigation. Estimated area to be brought under water, 140,000 acres from Klamath River and 72,000 acres from additional reservoirs, besides about 100,000 acres in Butte Creek Valley irrigable by pumping. About 1,104,000 acres have been segregated for sale, pending examination.

John T. Whistler and H. E. Green, engineers, made preliminary reports upon the Klamath project in 1903, justifying a further investigation this season. T. H. Humphreys, assistant engineer, reporting to the supervising engineer, is now in charge, with headquarters at Klamath Falls, Oregon. Topographic surveys of the Horse Fly and Clear Lake reservoir sites are being made under direction of T. S. Chapman. Estimated area of Clear Lake site, about 20,000 acres.

Near Keno, Oregon, F. K. Lowry is surveying the Klamath River to determine the possibilities of lowering and draining Lower Klamath Lake. Existing canal systems are also under survey with a view to utilization in connection with the general project. Gauging stations are maintained at many points and records of fluctuations, evaporation, etc., are carefully taken. Much other important work is also in hand, some of which will be prosecuted through the winter.

Sacramento Valley Project.—This is the northern portion (4,196 sq. mi.) of the great Central Valley of California, which, with the mountainous portions, has a total area of 26,187 square miles. The water supply is very great. From 1878 to 1885 the mean annual discharge of the Sacramento, at Collinsville was 25,936,000 acre-feet. The valley is very fertile, but the southern portion is subject to extensive overflow (800,000 acres flooded in March, 1904).

Comprehensive work is planned in co-operation with the State of California and in harmony with the work of the Topographical branch of the Survey and the Bureau of Forestry of the Agricultural Department.

The western side of the drainage basin and the northern portion as far as Pit River, inclusive, have been examined and reservoir sites surveyed aggregating in estimated capacity 1,800,000 acre-feet. Eight gauging stations are now maintained under the care of J. S. Evans, hydrographer. Stream measurements have been regularly taken at numerous points on tributaries. Estimates of cost of constructing dams on Putah Creek and at Jelly's Ferry have been prepared by H. E. Green, engineer.

S. G. Bennett, engineer, is in charge of field work, assisted by L. M. Lawson and J. S. Evans, and they have amassed abundance of data relating to this tract. Their contemplated work includes surveys of reservoir sites at Bieber, Canby, Jess Valley, Goose Lake, Adin and West Valley. After completion of the reports, the assistant engineers will be transferred to the Colorado River project.

Yuma Project.—Maps, plans and careful estimates have been prepared, supplemented by detailed observations of river flow, with a view to the proper utilization of the Colorado River for irrigation in California and Arizona. The project includes head works, and main canals upon both sides of the river, with pumping plants for certain portions of the area to be watered.

After very thorough study by our engineers and detailed examinations by Mr. H. A. Storrs, consulting electrical and mechanical engineer, followed by scrutiny of the board of six consulting engineers, there is a final agreement as to the best means to accomplish the ends in view.

The area to be available under the system is about 86,700 acres, out of some 107,000 acres accessible, a portion of which is too low or too high for economical irrigation at present.

The design adopted for the head works is one which has been thoroughly tested on the Nile. It consists of a loose rock structure with a paving of stones, the whole being tied together with three parallel longitundinal walls of steel and concrete between granite abutments. This is further protected by an apron of loose rock. The height of the weir is to be ten feet above low water. The upper core wall of concrete will rest upon a row of sheet piling driven into the bed of the river.

The handling of the silt is a difficult problem. At each end of the weir there will be a sluiceway 200 feet wide, in solid granite, closed by large gates operated by hydraulic machinery. The capacity of each sluiceway being about five times the low water flow of the river, it is believed that the plan will prove effective in use. But these figures do not adequately express the conditions. The bulk of the silt, as observations prove, passes near the bottom of the river. It is, therefore, proposed to place a row of flash-boards along the intake, so as to admit the water by a skimming process. This will permit the furnishing of the entire capacity of the canal by drawing only one foot in depth from the surface of the river. Besides, the first 3,000 feet of canal on each side of the river will be so constructed that the movement of water

will be less than one foot per second. These settling basins are planned so as to be readily scoured through gates opening to the river below the weir.

The construction of the whole system will be substantial and costly, but experience has proven this to be most economical in the end. About $1,000,000 will be expended in the head works portion and the canals are designed to limit seepage and other losses as much as possible.

A very troublesome matter will be the crossing of the Gila River. It has been found necessary to provide for a structure of steel and concrete, 3,300 feet in length, to pass several feet below the lowest bed of the river. It will also be necessary to construct levees of considerable extent along the reaches of the Colorado and Gila rivers. Drainage canals are considered essential also, owing to the natural lay of the land.

The cost to land owners benefited by these extensive improvements is estimated at near $35 per acre, to be paid back to the Government in ten equal annual installments. The cost for irrigation will be about $1 per acre per annum.

The sum of $3,000,000 is now set aside by the Secretary of the Interior, upon the recommendation of the Chief Engineer of the Reclamation Service, for the installation of the Yuma project.

Fossil Peak, Santa Catalina Island.

BY BLANCHE TRASK.

(Read Before the Section of Geology, Oct. 24, 1904.)

The fossil **Pecten estrellanus** Con. was found three years ago on one of our greatest elevations. It appears like a powder along the trail, while below, the eroded cliff-edge is thick-set with the shells from one to six inches in diameter.

Most of them are cracked and packed in the limestone as though by heavy pressure.

An adjacent peak is topped with rolled pebbles, while the great dikes of volcanic rock are visible here and there. In these erosions rainbows seem to be imprisoned, and when the winter rains set the emerald grasses aglow the effect is dazzling.

In the thousands of miles I have tramped here no other trace of fossils has been found. The elevation is about 1,500 feet above the sea.

A Preliminary Synopsis of the Southern California Cyperaceæ.*

BY S. B. PARISH.

5. SCIRPUS, Linn. Sp. Pl. 47—Bulrush.

Annual or perennial herbs with leafy culms, or the leaves reduced to basal sheaths. Spikelets terete, or obscurely flattened, solitary capitate, spikate or umbellate, the florescence subtended by a 1-several leaved involucre, or non-involucrate. Scales spirally imbricated all around, usually all fertile, or 1-3 lower ones empty. Perianth of 1-6 bristles, or in some species none; stamens, 2-3; style 2-3-cleft, not enlarged at the base, wholly deciduous, or the base persistent as a subulate tip to the achene.Achene 3-angled, lenticular, or plano-convex.

A genus of some 200 widely distributed species.

KEY TO THE SPECIES.

Spikelet solitary.
  Involucre wanting.
    Annual; 2-5 cm. tall........................1. **S. nanus**
    Perennial; 10-15 cm. tall...... ....2. **S. pauciflorus**
  Involucral leaf promptly deciduous..........3. **S. cernuus**
Spikelets normally more than one; involucre persistent.
  Culms 3-angled.
  Principal involucral leaf pungent.
      Leaves 2-6, long and narrow.........4. **S. Americanus**
      Leaves 0-2, short and broad...............5. **S. Olneyi**
  Involucral leaves all foliaceous.
Spikelets large, few, in a short-rayed umbel... 6. **S. Pacificus**
Spikelets small, many, in a decompound umbel..........
......................................7. **S. microcarpus**
  Culms, terete, sheathed at base, tall.
    Umbel of a few short rays; bristles barbed.8. **S. lacustris**
    Umbel decompound, long-rayed; bristles plumose...
    ....9. **S. Tatora**

**Spikelet solitary, terminal; stamens 3; style 3-cleft; achenes 3-angled; culms low, tufted.*

1. **Scirpus nanus,** Spreng. Pug. 1:4. Britton, Trans. N. Y. Acad. 11:74. Britt. & Br. Ill. Fl. 1:262. **Eleocharis pygmaea,** Torr. Ann. N. Y. Lyc. 3:315. Watson, Bot, Cal. 2:221.

Annual; culms filiform, flattened, grooved, leafless, erect, 2-5 cm. tall; spikelet ovoid-oblong, subacute, 3-8 flowered, 2-3 mm. long, bractless; scales ovate to lanceolate, 2 mm. long, pale green, the lower obtuse, the upper subacute; bristles mostly 6, retrorsely barbed, larger than the achene, or want-

* Continued from P. 86 (this volume) No. 6, June, 1904.

ing; achenes obovoid, smooth and shining, 1 mm. long, acute.

Specimens, said to be "too young for positive determination," collected April 18, 1854, at Cucamonga, by Bigelow, are referred here by Torrey, in Pac. R. Rep. 4:152. The species is not otherwise known from our region, and perhaps does not occur here. It is widespread both in Europe and America, and is usually found about salt marshes.

2. **Scirpus pauciflorus,** Lightf. Fl. Scot. 1078. Britton, Trans. N. Y. Acad. 11:75. Britt. & Br. Ill. Fl. 1:262. **Eleocharis pauciflorus,** Link, Hort. Berol. 1:284. Watson, Bot. Cal. 2:221.

Perennial by slender rootstocks; culms slender, rigid, striate, leafless, 10-15 cm. tall; spikelets oblong, very acute, compressed, 4-8-flowered, bractless, 5 mm. long; scales dark brown, hyaline margined, lanceolate, acuminate, 3 mm. long; bristles 2-6, as long as the achene or longer, or none; achene stramineous, obovoid, pointed, obscurely reticulate, 2 mm. long.

Bear Valley, 6,500 ft. alt. in the San Bernardino Mts., June, 1894, 3265 Parish. In our specimens the bristles are wanting. The species is a northern one, occurring on the Pacific Coast in the Sierra Nevada at considerable altitudes; eastward in the Rocky Mts., Minnesota, Western New York and Canada; also in Northern Europe.

3. **Scirpus cernuus,** Vahl, Enum. 2:285. Britton, Trans. N. Y. Acad. 11:76. **S. riparius,** Spreng. Syst. 1:208. Watson, Bot. Cal. 2:217.

Annual; culms tufted, setaceous or filiform, erect, 3-angled, 5-15 cm. tall, the uppermost sheath usually bearing a short leaf; involucral leaf solitary, erect, setaceous from a broad scarious base, not exceeding the spikelet, very promptly deciduous; spikelet ovoid to oblong, 2-5 mm. high; scales purple with pale midvein, or pale with brown markings, concave, oval, 1 mm. in diameter; bristles none; achenes brown, granulate orbicular, the inner face flatter and broader than the others, 0.75 mm. in width and height, mucronulate.

Common along the margins of wet streams and ponds, in the Cismontane region, below 1,500 ft. alt. Santa Monica; Hasse. Los Angeles; Braunton, Davidson. San Bernardino; Parish. A species of wide distribution in Europe, Australia and South America; but in North America known only from the Pacific Coast.

***Spikelets several or many, terminal, subtended by one or more involucral leaves; bristles 1-6; anthers tipped with an appendage, which is hispidulous, except in No. 7; styles 2 cleft; achenes plano-convex; perennials with stout, scaly horizontal rootstocks.*

+ *Culms 3-angled; sheaths nodulose; bristles retrorsely barbed*

++ *Involucral leaf stiff and erect, apparently continuous with the culm; scales obtuse or emarginate, the stout midvein terminating in a short mucro; spikelets in a sessile cluster.*

4. **Scirpus Americanus,** Pers. Syn. 1:68. Britton, Trans. N. Y. Acad. 11:78. Britt. & Br. Ill. Fl. 1:265. **S. pungens,** Vahl, Enum. 2:255. Watson, Bot. Cal. 2:218. **C. triangularis,** MacMill. Met. Minn. Vol. 99.

Culms 1-5 dm. tall; leaves 2-6, at length divergent, rigid, channeled, 1-3 dm. long, 1-3 mm. wide; involucral leaf, 2-20 cm. long, channeled; spikelets 1-4, ovoid to ovoid-oblong, acute, 5-10 mm. long; scales dark brown, ovate-oblong, 3-4 mm. long; stamens 3, appendages conical; achenes brown, obovoid, 1 mm. long, mucronate, equaled by the bristles.

Apparently confined in the Cismontane region to the coastal subregion. Los Angeles River; Davidson. San Diego; Chandler. Wet sand banks, San Pasqual; 1565 Parish. Also reported in the Botany of the Death Valley Expedition as abundant in marshes of the deserts of Inyo County. Throughout North America, and in Chile.

5. **Scirpus Olneyi,** Gray, Bost. Jour. Nat. Hist. 5:238.

Culms more or less deeply triquetrous, 3-20 dm. tall, 2-3 cm. wide; 1-2 of the sheaths usually bearing a thin, broad leaf, 2-5 cm. long, or leafless; involucral leaf, 3-angled, 1-2 cm. long; spikelets 2-20, oblong-ovoid acute, about 1 cm. long; scales brown, broadly ovate; stamens 2-3; achenes brown, obovate, mucronate, 2 mm. long, equaled by the bristles.

Very common in marshes of the Cismontane region; occurring also in the Desert region. Los Angeles; Davidson, Nevin. Temecula; Nevin, Parish. San Bernardino; Parish Salt Creek and Palmetto Springs, Colorado Desert; Alderson, North to Oregon; on the Atlantic Coast from Florida to Rhode Island.

ANNOUNCEMENTS FOR NOVEMBER, 1904.

The audience of 700 of our most intelligent citizens, who greeted Dr. Theo. B. Comstock, the lecturer at the November meeting of the Academy, was stimulating and, we trust, an earnest of awakened interest in the objects of our organization. We should like to see the habit formed of regular attendance upon these monthly sessions.

Monday evening, November 14, the Section of Biology met at the State Normal School. There was a most interesting presentation of "Studies of Some Forms of Chlorophyll-Bearing Microscopic Animal Life of Westlake."

1. Relationships of the Micro-Organisms............Prof. A. B. Ulrey
2 Phosphoresence and Cellulose of Animal Life..Dr. Eleanor Seymour
3. Chlorophyll-Bearing Animals...................Dr. C. A. Whiting

This section has in anticipation for its December meeting (Monday, 12th) a valuable paper by Professor Joseph Grinnell on the "Ecology of Mammals."

BOARD OF DIRECTORS,

1904-1905.

Professor Melville Dozier, President.
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Dr. C. A. Whiting.

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Program—Ex-officio, Dozier, Knight, Davidson, Ulrey, Parsons, Woodbridge, Baumgardt.

Publication—Comstock, Davidson, Knight.

Finance—Parsons, Whiting, Hooker.

Membership—Taber, Woodbridge, Baumgardt.

Affiliation—Knight, Ulrey, Davidson.

Secretaries of Sections.

Astronomy—Professor Melville Dozier.
Botany—Colton Russell.
Biology—Dr. C. A. Whiting.
Geology—G. Major Taber.
Agricultural Chemistry—E. M. Wade.

Meetings (Every Month except July and August).

Academy, General, First Monday.
Section of Biology, Second Monday.
Section of Astronomy, Third Monday.
Section of Geology, Fourth Monday.
Section of Ag'l. Chem., } as arranged.*
Section of Botany, }

All regular meetings of Academy and Sections are held at the State Normal School, West Fifth and Grand avenue.

Secretary's Office—116 North Broadway.

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*At present these two Sections meet at offices of their respective Chairmen. Section of Botany, Third Tuesday Evening, each month.

VOL. III. DECEMBER, 1904 NO 9

BULLETIN

OF THE

Southern California Academy of Sciences

COMMITTEE ON PUBLICATION
THEO. B. COMSTOCK, S. D.; A. DAVIDSON, C. M., M. D.; WM. H. KNIGHT.

CONTENTS:

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JULY, AUGUST AND SEPTEMBER

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MAILED JANUARY 9, 1905

Did You Forget?

The Editor of this Bulletin has secured enough new members, by personal effort, to entitle him to say to each reader: "**Go thou and do likewise.**" If every member of the Academy will accomplish one-eighth as much, **per capita,** it will very soon be feasible to make the editorials more attractive. It is not a pleasure, but a disagreeable duty, to urge upon you each month to perform what is no more than your due share of the work of upbuilding the Academy of Sciences. **Kindly avoid over-exertion in the cause.**

A Worthy Example

Mr. J. D. Hooker, who has heretofore contributed more than any other person to the funds of the Southern California Academy of Sciences, has generously defrayed the heavy expense of transporting the equipment of the great Observatory which is being constructed on Mt. Wilson under the direction of Professor Hale and others. We need more members of equivalent calibre.

TRANSACTIONS FOR NOVEMBER

I. ACADEMY SESSION, NOVEMBER 7, 1904.

The regular meeting of the Academy for November was held in the Auditorium of the State Normal School, a large and appreciative audience being present. The speaker of the evening was Dr. Theodore B. Comstock, and his subject, "Wild Nature in the Rocky Mountains."

The lecturer was appropriately introduced by the president of the Academy, attention being called to the fact that Dr. Comstock would speak from the results of his personal observation while engaged in exploring the Rocky Mountains in western Wyoming under the auspices of the government. After a brief and eloquent introduction to his lecture proper, the speaker proceeded to conduct his audience in imagination over the route pursued by his party of explorers, illustrating his descriptions of the magnificent scenery by stereopticon views of rare beauty and excellence. Such exhibitions of the beauty, grandeur and extent of our country, indicating the vast undeveloped resources yet to be utilized for the blessing of the human race, cannot fail to intensify the patriotic pride of our citizenship as well as to add to their enlightenment and general culture.

MELVILLE DOZIER, President.

II. DIRECTORS' MEETING.

The Board of Directors met at the Normal School, Monday, November 21, at 7:30 p. m., the President in the chair and G. Major Taber acting as Secretary. Messrs. L. R. Crowell, J. H. Morrow, Geo. H. Kress, M. D., Wm. Bebb and Chas. F. Lummis were duly elected members of the Academy. Application of Mr. J. W. Badger being informal, was approved, subject to formal presentation later.

Voted to reconsider the resolution passed at previous meeting regarding changes in dues and fees. After some discussion the matter was laid upon the table on account of necessity for adjournment to attend the meeting of Section of Astronomy, it being understood that a special meeting will soon be called for careful examination of the whole question.

G. MAJOR TABER, Secretary Pro Tem.

III. MEETINGS OF SECTIONS.

1. Section of Biology.

The regular meeting, at the State Normal School, November 14, 1904, was opened by a very interesting voluntary report by Prof. Ulrey on an Oegonium which he recently found in the Los Angeles River. The report was illustrated by black-board drawings.

C. A. Whiting briefly reviewed a report which appeared in The Journal of Neurology to the effect that the trunk of a paralyzed Seventh Nerve had been grafted on to the proximal end of an Eleventh Nerve and that eventually the Eleventh Nerve assumed the functions of the Seventh. Dr. Leonard briefly discussed the significance of the phenomena.

The minutes of the last meeting were then read and approved.

The subject of the evening was **Some Unicellular Organisms Found in Westlake Park.** Prof. Ulrey opened the subject by a discussion of the relationship of the various forms. The talk was illustrated by some very beautiful pen drawings as well as by black-board sketches.

The next subject discussed was that of Phosphorescence by Dr. Eleanor Seymore. Her paper was extremely interesting and it dealt with Phosphorescence not only among unicellular forms, but also among higher organisms, such as insects and the lower vertebrates. A considerable discussion followed.

C. A. Whiting then spoke on Chlorophyl in Animal Forms. He briefly described the several conditions under which it is found in animals, beginning with the clearly symbyotic forms and ending with those where the Chlorophyll seems to be an integral part of the animal.

Mr. Knight and Dr. Comstock announced the subjects for the November meetings of the Sections of Astronomy and Geology, respectively.

Prof. Grinnell will lecture before the Biological Section at its December meeting (12th) on **Mammalian Ecology.**

About twenty-five members and visitors were present.

On motion the meeting adjourned.

C. A. WHITING, Secretary.

2. Section of Astronomy.

The Section met in regular monthly session at the Normal School on Monday, November 21, 1904. Present a goodly number and Chairman Knight presiding.

Mr. Knight opened the exercises of the evening by reading a number of recent extracts relative to meteoric observations at various points during the August period, the observations having been confined chiefly to August 10th, 11th, and 12th, and to the Persean group. He also gave an interesting account of an observation made by himself and daughter in November, when they were rewarded with a view of about a dozen fine meteors of the Leonid group. Among the facts of astronomical interest mentioned by Mr. Knight were the following:

Harvard is to have a sixty-inch reflecting telescope.

The bright star Aldebaran is to be occulted by the moon on December 20th, at about 5 o'clock p. m. Aldebaran is said to be eight hundred and eighty times the mass of the sun, with a diameter of over 8,000,000 miles; a distance so great that a meteor traveling at the rate of thirty miles per second, would require over three days to cross the disk of the star. Yet, notwithstanding the immense volume, the accultation will occur in a moment, so great is the distance of the star from us, and will continue for about one hour and eight minutes.

Encke's comet completes its successive periods in about two hours less time each. It will appear again on December 1st, near Altair, which is Alpha Aquilae.

The planet Jupiter is now in opposition for the first time since its fifth satellite was discovered by Prof. Barnard, in 1892. Jupiter's period of revolution is twelve years, and the position of opposition brings it 180,000,000 miles nearer the earth than when in conjunction; and is, therefore, the most favorable opportunity for observation.

The satellites of Uranus revolve about their primary in a direction opposite to the motion of the planet. This movement is apparent rather than real, being due to the fact that the inclination of the planet to the plane of its orbit is about ninety degrees.

The chairman introduced Mr. B. R. Baumgardt, the speaker of the evening, who proceeded, in his own clear and concise form, to give a cursory account of his observations at the World's Fair in St. Louis, where he had gone to attend the international astronomical congress. Mr. Baumgardt gave it as his ponion that in its personnel, discussions and results, this was the most remarkable scientific gathering that has ever been held in the history of the human race. This opinion was confirmed

by a number of eloquent editorial extracts, read by him, descriptive of the exceeding excellence and world-wide importance of the congress. Special reference was made to the work of the solar research committee, which is composed of men most eminent in present astronomical investigation, and which committee met to determine, among other things, the true length of a wave of light and to build upon this unit a scientific system of measurements. The speaker gave a most interesting account of a great and notable banquet, at which were gathered over seven hundred recognized scientists of various portions of the world, and at which some of the most famous men of the world spoke in response to toasts.

He also made very complimentary reference to Japan's industry and method of developing the animal life of the ocean, and of her remarkable skill and economy in utilizing for valuable purposes the material which Americans throw away as waste.

In Mr. Baumgardt's description of the intensely interesting tests being made of the comparative excellencies and efficiency of turbine and gas engines at the fair, he expressed preference for the former in matters of power, economy of use, and readiness of adaptation.

The meeting of the Section adjourned, conscious of having enjoyed a profitable hour. MELVILLE DOZIER, Secretary.

3. Section of Geology.

Meeting held at the State Normal School Building, November 28, 1904. Chairman Geo. W. Parsons introduced the speaker, Prof. W. L. Watts, who gave a very interesting lecture on the Geology and Physical Geography of Southern Mexico. In speaking of the general topography of that country he stated that there are two ranges of Sierra Madre mountains with a broad plateau between them. The central portion of Southern Mexico consists of a network of mountains. Some of the peaks are 17,500 feet above sea level. The Tropic of Cancer crosses the center of that section, and below this the climate is warm, tropical fruit being raised in abundance. The mountains are only in part of sedimentary formation, the volcanic rocks covering wide areas. In the more southern portion, wild rubber and cotton trees are abundant. Remains of an old smelter built 100 years ago stand in a locality in Oaxaca where suitable ores for treatment therein are not very evident. Caves occur in northwest Oaxaca, and there are many mines which were formerly worked at a profit. Farther east, near Pueblo, there is a pyramid similar to those in Egypt. Professor Watts visited numerous mines in several states of Mexico. The geology has been but little studied, the field for exploration being most enticing. Some coal and oil are found in Cretaceous rocks, but the coal is of poor quality. The City of Mexico is now well sewered and healthy. Some Aztec relics in the old temples were also described.

Chairman Parsons then gave a brief description of what he observed in his recent trip to the City of Mexico. Dr. Theo. B. Comstock also made a few remarks relating to the great backbone fault system extending from California, through Nevada, Arizona and Mexico, Professor Watts having previously described its occurrence in Southern Durango.

Some discussion followed in which ladies took part.

G. MAJOR TABER, Secretary.

4. Section of Botany.

At the meeting of the Botanical Section, held November 15, 1904, Mr. Theodore Payne and Dr. Davidson presented papers on "The Desert Flora of Thermal and Neighborhood." Specimens of the rarer species were exhibited. COLTON RUSSELL, Secretary.

Catalogue of Indian Relics Found on Santa Catalina Island.*

BY MRS. M. BURTON WILLIAMSON.

13,343-44. Steatite comali, plain.
13,345-47. Steatite comali, perforated.
13,348. Steatite comali, grooved and perforated.
13,349. Steatite comali, boring unfinished.
13,350. Stone comali, perforated.
13,351. Large stone pipe.
13,352. Stone pipe.
13,353. Stone pipe, broken.
12,354-55. Stone pipe, boring unfinished.
13,356. Stone pipe, with rings.
13,357. Stone pipe, steatite.
13,358. Perforated stones—5.
13,359. Perforated stones—3.
13,360. Perforated stone bead.
13,361. Perforated flat stone.
13,362. Perforated stones, polished on one side—2.
13,363-65. Stone pestles.
13,366. Stone pestle, showing how mended.
13,367. Stone pestle, pear-shape.
13,368. Stone pestle, round.
13,369. Small hammer stone.
13,370. Stone implements—3.
13,371. Rude stone implement.
13,372. Stones for grinding paint.
13,373. Steatite, with grooves—2 pieces.
13,374. Stone implement.
13,375. Perforated stone saw.
13.376-78. Stone implements.
13,379. Implement.
13.380. Fragments, stone implements—3.
13,381. Flint dagger, asphalt on base.
13,382. Flint dagger, broken.
13,383. Flint knife.
13,384. Flint knife.
13,385. Obsidian arrowhead.
13,386. Broken arrowhead and chips—3.
13,387. Stone ring, broken.
13.388. Stone for straightening arrows, broken.
13,389. Bone awls, fragments—8.
13.390. Bone implements, fragments.
13,391. Bone, for extracting marrow.

*Continued from Page 63 (this volume) April, 1904.

13,392. Bone dagger.
13,393. Bone implement, broken.
13,394. Bone—2.
13,395. Shells.
13,396. Shells, ornaments and pieces of fishhooks.
13,397. Perforated shell ornaments.
13,398. Claws of panther.
13,399. Fragment, basket work.
13,400. Charred.
13,401. Paint.
13,402. Seeds.
13,403. Seeds, ground.

POTTS VALLEY, SANTA CATALINA, CALIFORNIA.

13,404. Large stone dish, broken.
13,405. Unfinished pot of steatite.
13,406. Steatite pot, blocked out.
13.407. Small steatite pots, blocked out—3.
13,408. Small steatite pots, broken—6.
13.409. Fragment, steatite pot.
13,410. Pieces of steatite from ledge.
13,411. Rude stone implements—5.
13,412. Rude implements, chalcedony and quartz—6.
13,413. Small steatite pot, broken.
13,414. Small steatite pot, with groove.
13,415. Fragment, lava pot.
13416-17. Steatite comali, perforated.
13418. Steatite comali, plain.
13,419-20. Perforated stone, digging weights.
13,421-25. Perforated stones, various—5.
13,426. Stone digging weights, broken.
13,427. Pipe stone.
13,428. Arrow straightener.
13,429. Grooved hammer stone.
13,430. Round hammer stone.
13,431. Grooved stone ax.
13,432-36. Stone pestles—15; one broken.
13,437. Small rubbing stone.
13,438. Stone ornament, grooved.
13,439. Stone ornaments, rattlesnake rattle.
13,440. Perforated stone ornament (bifurcated).
13,441. Shell.
13,442. Shell full of seed.
13,443. Bone mouthpiece to pipe.
13,444. Ditto, charred.
13,445. Stone knife.

13,446. Obsidian knife.
13,447. Charred.
13,448-9. Human skulls and bones—2.
13,450. Bones of child found with 13,177, Graves at Isthmus, Santa Catalina.
13,451. Charred ?, found with 13,177. Graves at Isthmus, Santa Catalina.

CATALINA ISLAND, CALIFORNIA.

14,757. Concha zagua.
14,758. Yerba de la bibora.
14,759. Seed used in making "Pinole."
14,760. Cacometas.
14,761. Cobenas.
14,762. Also called Cacometas.
14,763. Cibollas (wild onions).
14,764. Indian tobacco, dwarfed.
14,765-70. Pots, form blocked out—**Quarry, Catalina Island.**
14,771-73. Steatite pots, unfinished.
14,774-75. Steatite pots, broken.
14,776-80. Steatite pots, unfinished, broken—**Ancient Quarry, Catalina Island.**
14,781. Steatite dish, boat shaped.
14,782. Fragments, steatite pot.
14,783-84. Unfinished steatite, comali.
14,785. Chisels, slate—6.
14,786. Rude scraper, quartz.
14,787. Rude scraper, stone.
14,788. Rude scraper, petrified bone (?).

WHITNEY'S PLACE, CATALINA ISLAND.

14,789-93. Skull and bones.
14,794. Stone mortar.
14,795-97. Small dishes, steatite.
14,798-800. Large weights for digging sticks.
14,801-05. Weights for digging stick; 14,802. Polished one side; 14,803. With 7 grooves.
14,806-08. Comali, steatite, perforated.
14,809-11. Comali, steatite, toy.
14,812. Comali, steatite, fragments.
14,813-16. Sharpening stones, variously marked.
14,817. Rubbing stone—6.
14,181. Implements of steatite—2.
14,819. Steatite comali, 2 perforations.
14,820-21. Pipe stones—2.
14,822. Sharpening stone, steatite.

14,823. Stone knife.
14,824. Stone dagger, broken.
14,825. Stone arrowheads—2.
14,826. Stone drills.
14,827. Arrowhead, Obsidian.
14,828-29. Pestles.
14,830. Bone whistle.
14,831. Bone dagger.
14,832. Bone awls.
14,833. Bone implements, bird bone.
14.834. Teeth of Cetaceans.
14,835. Small shell beads.
14,836-37. Shell beads.
14,838. Small glass beads.
14,839. Glass beads.
14,840. Stone bead.
14,841-44. Shell ornaments, many.
14,845. Fragments of shell ornaments.
14,846. Shell fish-hooks.
14,847-48. Circular shell ornaments.
14,849. Small shell dish.
14,850. Ornament of (?).
14,851. Fish spine used as paint pot.
14,852. Vertebra of fish, as paint pot.
14,853. Red paint.
14,854. Fragment of basket work, charred.
14,855. Seed, unknown.
14,856. Shark's tooth, perforated.
14,857. Glass and brass beads on string.
14,858-59. Painted stones, red and white circles.

N. B.—Timm's Place, Catalina Island, is the site of the present town of Avalon. (Locality of No. 14,859.)

NOTE.—William Henry Holmes, head curator, Department of Anthropology, of the Smithsonian Institution, in "Anthropological Studies in California," records a number of curios found by him in an ancient grave at the Isthmus:

"There were also parts of three or four steatite vessels, one small pot, a round shallow dish, two oblong dishes, and a flattish oblong plate with squared end, probably a baking plate. Other articles were evidently mere burial offerings made for the purpose and doubtless symbolic. They include a steatite hook of a form common in the region, a miniature pest of steatite, a peculiar object, apparently a much conventionalized fish or finback whale, three ladles of steatite utensils, apparently dipper handles, an obsidian arrow point, and some decayed shell ornaments."

In deposits of kitchen-middens, Mr. Holmes found "many abalone shells and some rude stone utensils, the latter including a flattish spatulate stone, one end of which was covered with asphaltum."

(Concluded.)

Pre-Historic California*

BY DR. LORENZO G. YATES.

Aboriginal Shell Money and Ornaments.

One of the peculiar characteristics which distinguish mankind is universally developed acquisitiveness, a trait seldom observed among other animals. Ancient history and the oldest remains of man demonstrate this characteristic to have been one of the heritages common to all peoples, under all circumstances.

The skeletons of prehistoric man when unearthed by his successors, are accompanied by the rude and simple personal effects which were buried with the original owners; the weapons and ornaments acquired during life were placed in the grave by surviving friends or family, in order that they might be of service after death, or to relieve the survivors from the unpleasant reminders of departed friends by the sight of their former belongings. Later, as man advanced in civilization and acquired more wealth, his belongings increased in bulk and numbers until it became impossible to bury them all. Then selections were made, and perhaps a favorite weapon, horse, wife or slave was allowed to accompany the dead on his journey to the unknown world. Where cremation was practiced, the property was placed in the fire with the deceased.

Originally exchanges were made between individuals by bartering one thing for another, and one who owned or possessed more of an article of utility or ornament than he required, and being desirous of obtaining some other article which he did not possess, exchanged a portion of his surplus with some other individual who had it to spare. In time this troublesome method was improved upon by the utilization of some peculiar or rare form of a particular material, which could be carried about the person or transported from place to place, and which came to have a recognized or intrinsic market or purchasing value, for the acquirement of the necessaries and luxuries of life.

The first authentic history we have of the Ancient Romans using metal for this purpose was about B. C. 400. At that time the ox was the standard of value. Originally the animals were transferred from one owner to another, but this method of trade being inconvenient, irregular masses of bronze representing the value of an ox were used. These were succeeded by bronze imitations of various animals, representing their value.

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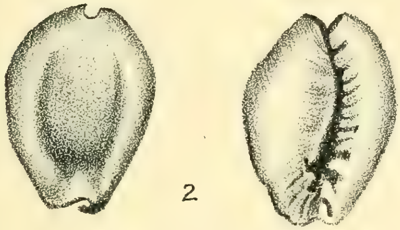
*Continued from Page 10 (this volume) No. 1, January, 1904.

About two thousand years ago the Romans commenced using circular coins of bronze. A coin of this character made about 2100 years ago (Fig. 1. Pl. 1.) is in the writer's collection. It was found in the ruins of Herculaneum.

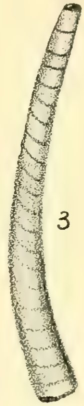
Among the simplest objects suitable for moneys and adopted as such, were handsome natural crystals, or other forms of mineral substances, and the beautiful shells of the sea shore. These objects, in our age of universal travel and interchange of commodities between nations and peoples throughout the world, are easily obtained; but in the earlier history of our race they were rarely carried far from their original habitat. Those peoples or tribes who had the good fortune to occupy the regions near a sea shore had a great advantage over their neighbors of the interior, in the comparative ease with which they could obtain a supply of the shells which, by general consent and usage, came to represent a bartering or purchasing power. At some time during the history of many tribes sea shells were recognized as universal media of exchange, and to this day the natives of Africa, the Islands of the Pacific, and some other countries use the Cowrie as money. This custom was so general that when, after long ages of advancement, arts and sciences were evolved, and man studied and classified the other representatives of the animal kingdom, the marine shell referred to was named, and is still known as **Cypraea moneta,** or "The Money Cowrie;" (See Fig. 2, Pl. 1). In countries where the cowrie is not found, or was not attainable, other shells of different genera and species were used as representing purchasing power.

In this manner, also, the natural acquisitiveness of the race manifested itself. Man did not stop acquiring when he had sufficient food, weapons and utensils for his immediate use, but these shells were carried on the person, for the purpose of purchasing such objects as their possessor might take a fancy to acquire or store away, to be brought out and displayed upon great occasions, as material evidence of the wealth or importance of the owner. A similar natural pride is shown by more civilized peoples in the wearing of fine clothes, jewelry, diamonds and other precious stones, the display of fine horses and carriages, expensive and elaborately ornamented dwellings, expensive furniture and bric-a-brac.

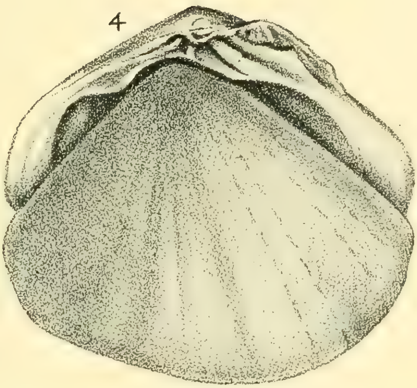
The Indian tribes of North America have for many ages used portions of marine shells as money, and for more than two centuries these shell beads formed the principal medium of traffic between the Indians and the white man under the name of wampum, or "wampum peage"; and so wide spread and common was its use that the whites gave it a legal status



THE MONEY COWRIE

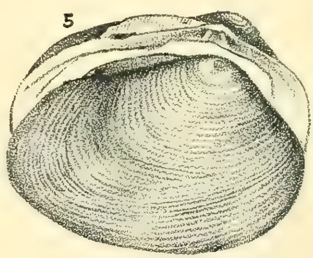


DENTALIUM



½ NAT. SIZE.
PACHYDESMA (TIVELA) CRASSATELLOIDES

½ NAT. SIZE
ANCIENT ROMAN BRONZE COIN
ABOUT 200 B.C.



½ NAT. SIZE
SAXIDOMUS ARATUS

L.G. YATES. DEL.

LITH. BRITTON & REY S.F.

ABORIGINAL SHELL MONEY OF CALIFORNIA.

by fixing its value and making it a legal tender for any sum under twelve pence, at the rate of six beads for a penny. In those days (1637) money had a much greater purchasing capacity than it has at present.

In New York, for nearly half a century, wampum was almost the only currency in use, and was employed in the Indian trade down to nearly the middle of the nineteenth century.* Connecticut at one time made it a legal tender for any amount and receivable for taxes at four beads for a penny. This "wampum" of the Atlantic Coast was the exact counterpart of some of the "shell money" of the Pacific Coast, although made from different species of shells.

While cowries and other shells which were used entire, were rated by their beauty and their convenient form and size, the value of the individual piece of shell forming the beads of which the string of wampum was composed rested on the amount of labor it represented. The cowrie was the lazy man's coin, for when found on the sea shore it was ready coined by nature; but. in other cases, the shell was first broken into pieces of suitable size, then rubbed on a stone to give the proper shape, then pierced with a drill point of stone, when it was ready to string, after which the final finish was given by rubbing between flat stones. The fragments were sometimes used without being strung, when they were called "sewan."

Strings of white shell beads were most commonly used, and they were valued according to the number of beads or the length of the string. It was not to its purchasing power alone that wampum owed its valuation. The social system of the aborigines required that on all state occasions, great public acts should be accompanied by a display of wampum. A string of wampum was the emblem of the authority by which a messenger summoned the members of the tribe to council; a string of wampum was laid down at the end of each clause of a treaty between ambassadors of different powers; treaties were ratified by exchange of wampum; war was declared by the formal delivery to the offending party of a belt of black wampum. A string of black wampum borne by a messenger announced the death of a chief, and at his burial large quantities of it were placed in the grave with the body, or burned with it if the body were cremated; the object in either case being to supply the deceased with funds for his journey.

Major Rodgers, in writing of North America, in 1765, says of the wampum used by the Indians of that time:

"They have the art of stringing, twisting and interweaving them into belts, collars, blankets, moccasins, etc., in ten thousand different

sizes, forms and figures, so as to be ornaments for every part of dress, and expressive to them of all their important transactions."*

"According to the Indian conception, these belts could tell, by means of an interpreter, the exact rule, provision, or transaction talked into them at the time, and of which they were the exclusive record."**

They mix and dispose the wampum of different colors and shades, so as to be significant among themselves of almost anything they please, and by these their words are kept and their thoughts communicated to one another, as ours are by writing.

As there were no restrictions on the production of wampum by the white people, the Dutch burghers of New Amsterdam embarked in its manufacture. But, although they had the advantage of machinery and better tools, they did not make a success of the business; for we learn that the counterfeit was so poorly made that Massachusetts and Connecticut were obliged to legislate upon the subject of "bad, false, and unfinished peage" (wampum peage, or shell money).

Shell Money of California.

Although we know comparatively little of the former history or the details of the life and customs of the aborigines of our coast previous to its settlement by the whites, it is certain that they used shells for money and ornaments. Exploration of the ancient graves has shown that the custom of burying money with the dead was practiced long before their contact with the white people. The Indians of the northwest used the Dentalium, or tusk-shell, as money (See Fig. 3, Pl. 1) and with them its use was almost as common as was that of wampum on the Atlantic Coast. Among the Indians of Northern California this tusk-shell money was called alli-co-cheek, meaning Indian Money.

These shells are collected by the Indians in the following manner:

"An Indian when shell-fishing arms himself with a long spear, the haft of which is of light deal; to the end of it is fastened a strip of wood placed transversely, but driven full of teeth made of bone. The whole affair resembles a long comb affixed to the end of a stick with the teeth very wide apart. A squaw sits in the stern of the canoe, and paddles it slowly along, whilst the man with the spear stands in the bow. He stabs this comb-like affair into the sand at the bottom of the water, and after giving two or three prods, draws it up to look at it. If he has been successful perhaps four or five money shells have been impaled on the teeth of the spear."***

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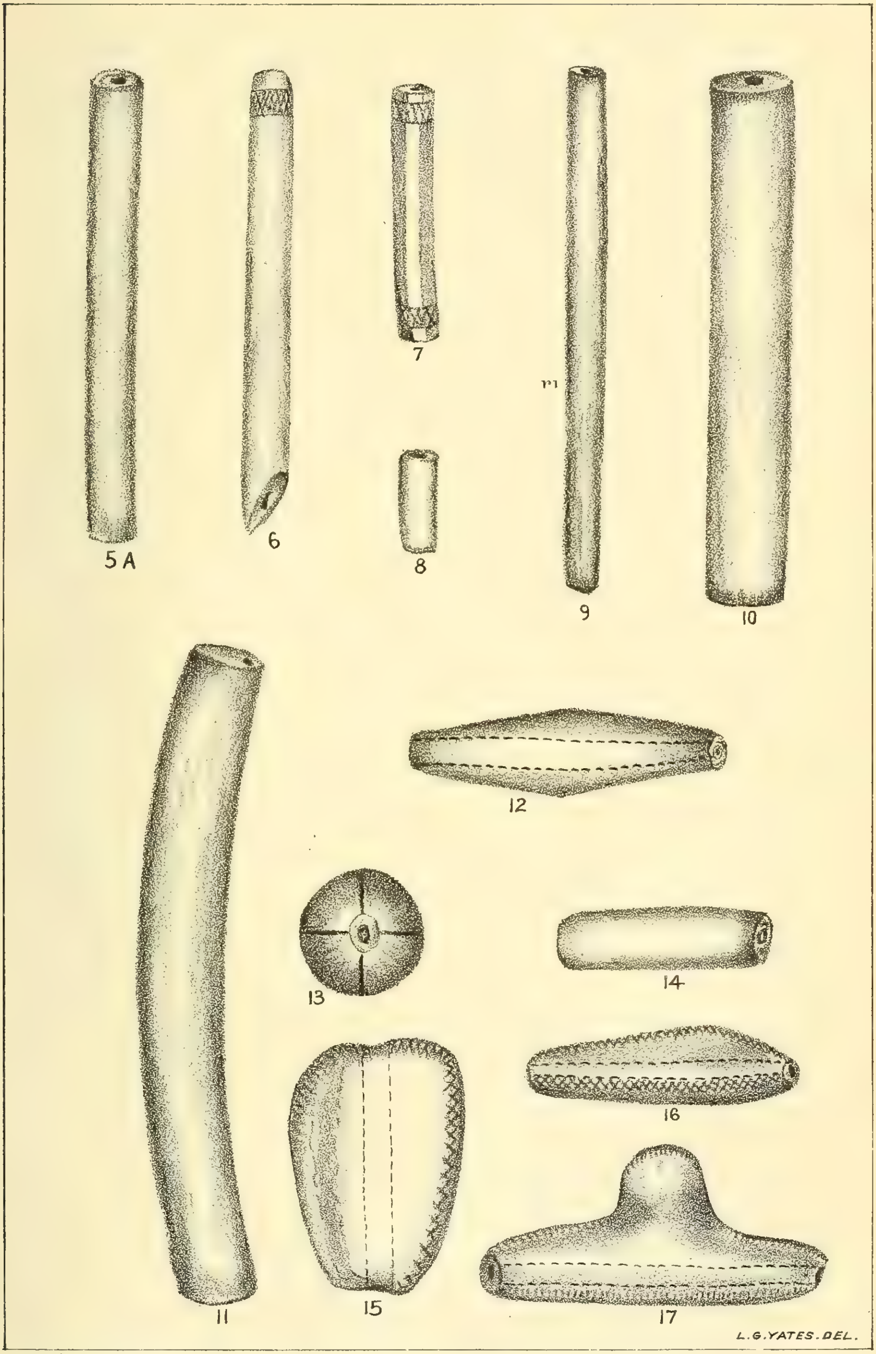
*See Horatio Hale, on "The Origin of Primitive Money," in Popular Science Monthly, January, 1886.

**Ethno-Conchology, by R. E. C. Stearns, in Report of U. S. National Museum, 1886-87, p. 313, Washington, 1889.

***Report of U. S. National Museum for 1886-87, p. 315.



LITH. BRITTON & REY S.F.

ABORIGINAL SHELL MONEY OF CALIFORNIA

The unit of value of this currency differed somewhat among the different tribes; with some it was a string of the length of a man's arm, consisting of a certain number of long shells from the end of the fingers to the elbow, and shorter ones above. Such a string was formerly valued at from forty to fifty Dollars in gold. With others, the standard of measurement was a string of five shells, valued according to the length of the shells. These were worth from ten to twenty-five dollars in gold; or, from two dollars a shell for those of ordinary length, to five dollars a shell for the longest. A wife could be bought for from three to ten strings of alli-co-cheek.

This dentalium money was also highly prized by the Indians of the interior, and, as late as 1866, ten of these shells would buy a superior buffalo robe. Among the Indians of Southern California the Dentalium was used in a subordinate way, also; but the use of the "tusk-shells" (Dentaliums) as money or ornaments was much less common than in the extreme northern portion of the state. The shell-money made from the columellas of some of the larger univelve shells had a Dentalium imbedded in asphaltum at the lower, or larger end, thus reducing the size of the opening to make it correspond with the upper end or point of the shell bead, to hold it in the proper position when strung with other money.

The Dentalium was, moreover, a very ancient inhabitant of California; for, in some rock recently brought from an altitude of over 6,000 feet on the San Rafael Mountains, several specimens of shells of this genus may be seen. They are also found in other localities imbedded in rocks of cretaceous age.

In Central California the shell money was largely manufactured from the shells of Saxidomus and Olivella. In Southern California, in addition to those named, quite a number of other genera were used, principally the Tivela (Pachydesma) crassatelloides, the "Big Clam" (See Fig. 4, Pl. 1). The Tivela is a bivalve shell of large size, close texture, fine grain, and ivory white color. It is found much larger than here figured, and from one-fourth to nearly one inch in thickness.

Amiantis (Callista) callosa, a somewhat similar shell, which was used for the same purpose, is of finer grain and whiter color. Beads or ornaments made from either of the two above named species of shells can scarcely be distinguished from bone or ivory, for which they are often mistaken.

These represented the bullion from which the money was manufactured, the shell being first cut or worked into suitable size and form, then rounded and drilled (Figs. 5 to 14, Pl. 2). How the aborigines managed to drill holes of the size and

length commonly found is a question which has not been satisfactorily answered. It will be seen, by reference to Fig. 11, that the hole, which is of uniform size (one millimeter) throughout, is considerably curved. A line drawn between the two extremities of the hole, on the concave side, would be about one-quarter of an inch from the middle of the curve; yet this hole is no larger than an ordinary knitting needle, is curved to correspond with the outer line of the bead. No drills have been discovered in the graves which would do the work referred to. Figs. 12 and 13, Pl. 2, represent beads drilled with stone tools, but the tapering form of the drill made the holes too large at the ends, and glass beads were used to reduce them to the size required. This style of work, however, was done after the advent of the white people, when glass beads were used instead of the dentalium shells formerly used for the same purpose.*

(To be continued.)

*See also Figs. 18 and 19, Pl. 3: (to follow)

There is much discussion now concerning the theories which have become traditional among geologists. In different directions and upon new grounds the nebular hypothesis is being attacked as untenable and inadequate to explain phenomena heretofore even used as arguments in its favor. Disclaiming here any intention of assuming to speak for astronomers, there is a growing belief among geologists that a complete revision of the sub-stratum of geologic theory is becoming necessary. That the failure of certain theories, which attempt to explain natural phenomena, to give explanation of the phenomena themselves, has involved geologists in illogical conclusions while employing logical methods of reasoning, is the contention of a writer in the American Geologist.* The discussion of the paper will be taken up in a later issue.

Professor T. C. Chamberlin, Head Professor of Geology in the University of Chicago, has long since taken ground against some preconceived notions in geology, as to the formation of the earth and its general life-history. His views also antagonize the nebular hypothesis and they are closely in accord with some of the opinions expressed by Sir John Murray in his recent lecture on ''Oceanology,'' published in this issue of the Bulletin. Professor Chamberlin adopts what is known as the planetesimal theory of the earth's origin, and he believes that the compression due to cooling is, as it were, squeezing out gaseous ingredients, and that this process, in varying quality, has been going on for ages. In a way this has bearing on the nature of radio-active substances, which are now attracting the attention of investigators everywhere.

*The Untenableness of the Nebular Theory. By N. Mistockles. Part I., American Geologist, Vol. XXXIV., No. 4, Oct., 1904, p. 226; Part II., No. 5. Nov., 1904. p. 310; Part III., No. 6, Dec., 1904. p. 361.

The Bees of Southern California. VI.*

BY T. D. A. COCKERELL.

TRACHUSA, *Jurine*.

Trachusa perdita, n. sp.

Male; length about 12 mm.; black; head and thorax rugose, the punctures excessively close, the dorsum of the thorax entirely dull, its pubescence and that of occiput light greyish with a faint yellowish tint; that of face, cheeks, pleura and sides of meta-thorax white; clypeus and lateral face-marks cream-color; the lateral marks triangular, filling the interval between the clypeus and the eyes, and ending a little above the level of the upper margin of the clypeus, the angle formed by the upper margin of the lateral face-marks and the eye a right angle; clypeus shining, the punctures strong, but well separated, a strong median longitudinal ridge; middle anterior margin of clypeus with six little brown nodules; mandibles black; facial quadrangle much longer than broad; antennae entirely black, third joint longer than fourth; thorax black without markings; tegulae very dark brown, strongly punctured; wings stained with reddish brown, especially in the marginal cell; second recurrent nervure passing beyond tip of second submarginal cell; basal nervure meeting transverso-medial; legs entirely black, except that the tibial spurs are reddish-orange, and the claws are ferruginous at base; pulvilli large; abdomen black without light markings, the hind margins of the segments with thin bands of white hair; punctures stronger and closer on the second and fifth segments than on the third and fourth; sixth segment with a subapical nodulose transverse keel from which proceeds a little keel in the middle line to the hind margin, which is ferruginous and curved outwards; seventh segment black, broadly and deeply emarginate; genitalia dark ferruginous.

Tehachapi, California; one collected by Dr. Davidson. The genus **Trachusa** has hitherto been known from Europe, and its discovery in America is of great interest. The present species departs from typical **Trachusa,** and leans towards **Dianthidium,** in the venation; evidently the two genera are closely allied. In general, it is remarkable how greatly our insect resembles **T. serratulae,** which I have from Innsbruck (Fiese).

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*Continued from p. 90 (this volume) No. 6, June, 1904.

Erratum. In part V, p. 88, the characters given under 4 in the table refer to **A. cardui,** ckll. A couple of lines were omitted in printing.

BOMBOMELECTA, *Patton.*

Bombomelecta edwardsii (Cresson).

Los Angeles, one male (Davidson). Previously known from Ocean View. When sunlight is allowed to fall on the abdomen from in front, the surface presents a strong purple lustre.

CENTRIS, *Fabricius.*

Centris hoffmanseggiae, subsp. nov. **davidsoni.**

Male; length about 15 mm.; black; face very narrow, the eyes large and prominent, pale ochreous when dry; ocelli large, distance between the lateral ocelli and the eyes less than the diameter of an ocellus; clypeus, a narrow supraclypeal stripe, and labrum cream-color; clypeus shining and sparsely punctured; mandibles with a cream-colored stripe on the upper margin; pubescence of occiput, mesothorax and scutellum pale ochreous; of cheeks, pleura and metathorax white and strongly plumose; scutellum prominent, shining, with strong punctures well separated; tegulae testaceous; wings rather milky, nervures brown; legs black, the spurs and small joints of tarsi ferruginous; hair of legs white, slightly orchraceous on tibiae in front, very dark brown on inner side of basal joint of hind tarsi; abdomen rather densely covered with erect greyish-white hair; apex produced and rounded; ventral segments with the hind margins whitish. Mandibles tridentate. The type of **hoffmanseggiae,** when the abdomen is viewed laterally, shows short dark fuscous hair on the fourth and fifth segments; **davidsoni** shows larger and entirely light hair on these segments, and is a larger insect.

Banning, Cal., one (Dr. Davidson).

Dr. Davidson's collections are bringing out the fact that in the bees, as in several other groups, species are represented in many instances by an inland form, of the arid parts of Nevada, Arizona, New Mexico, etc., and a closely allied but distinct California form. In the absence of collections from many intermediate localities, it is impossible to say in each case whether these really intergrade; but when they are very closely allied, I treat them as geographical races of a single species for the present. Such a course, while subject to revision, at all events serves to indicate the obvious relationships.

Centris cockerelli, Fox.

I give a new description, as the existing one is rather too short.

Female; length about 12 mm.; black, shining; clypeus (except lateral and superior margins) and labrum reddish in the California specimens, but evidently changed from orange by cyanide; eyes, when dry, gray; vertex about ocelli very shiny,

hardly punctured, a tuft of fulvous hair just behind ocelli; hair of occiput whitish, of cheeks white; antennae black; facial quadrangle longer than broad; hair of thorax very dense, tinged with ochreous, and even with fulvous above; tegulae pale testaceous; wings slightly dusky; legs black, with mainly black pubescence, but that on anterior femora behind yellowish-white; the abundant and coarse scopa of hind tibiae and tarsi wholly black; abdomen black, practically nude, only the first segment with pale pruinose pubescence. The pectoral hair of thorax is variably sooty in this species, so **C. foxi,** Friese, must be separated on the characters of the clypeus and labrum, not those of the pubescence.

Palm Spring, Cal., two collected by Dr. Davidson. Previously known from New Mexico.

EMPHOROPSIS, *Ashmead.*

Emphoropsis infernalis, (Dalla Torre) subsp. nov. **tristissima.**

Female; length about 14 mm.; black, robust, with the pubescence entirely black, except a little reddish on hind part of mesothorax, and dark reddish on inner side of basal joints of tarsi; facial quadrangle broader than long; inner orbital margins straight; clypeus coarsely rugoso-punctate; labrum covered with black hair; pubescence of thorax and first segment of abdomen dense, rest of abdomen rather shining and not conspicuously pubescent; tegulae very dark brown; wings only a little dusky; knee-plates of hind tibiae whitish with a large reddish patch, very conspicuous; legs normal, hind tibiae and tarsi more or less ferruginous. Lacks the light pubescence seen in typical **infernalis,** which is from Nevada.

Los Angeles, one, and Lancaster, Mohave Desert, one, both collected by Dr. Davidson.

E. infernalis was described as an **Anthophora,** but Dr. Ashmead wrote me, some years ago, that it was an **Emphoropsis.**

ANTHOPHORA, *Latreille.*

Anthophora crotchii, Cresson.

Dr. Davidson obtained one at Banning; I give a new description, that of Cresson being rather short.

Male; length about 16 mm.; black; head and thorax with abundant yellowish pubescence; that of abdomen more scanty, whitish basally, but erect and black on the third to sixth segments, the sixth fringed with whitish, and a light tuft on each side of the apex; eyes large, reddish when dry; facial quadrangle considerably longer than broad, narrowest in the middle; ocelli large, a prominent tuft of long ochreous hair just

behind the anterior ocellus; scape flattened, shining and entirely orange in front, black behind; rest of antenna black; clypeus very prominent and convex, it, the labrum, the lateral face-marks, a supraclypeal band, and the greater part of the mandibles, orange; a tuft of hair on the lower corner of clypeus on each side of labrum; lateral face-marks occupying the space between the clypeus and the eye, and sending a narrow stripe along the inner orbits to a little beyond the level of the antennae; tegulae piceous; wings nearly clear, marginal cell appendiculate; legs black, the tarsi becoming ferruginous; middle femora conspicuously fringed with ochreous hair behind; middle tarsi with long white hairs, the basal joint with short orange hairs within, the last joint with a broad black fan of hairs like a peacock's feather; hind trochanters with a low conical tubercle; spurs of hind tibiae far apart at base; hind tarsi normal except that the basal joint is broadened and flattened; hind margins of the abdominal segments narrowly pallid.

PUBLICATIONS RECEIVED.

Mining Magazine. Vol. 5, No. 4. Dec., 1904.

The Hop Aphis. By Warren T. Clarke. Bull. No. 160.

Tuberculosis in Fowls. By Arch. R. Ward. Bull. No. 161.

Sulphurous Acid and Sulphites as Food Preservatives. By C. E. Calm, Ph. D., Chicago.

Contribution to the Study of Fermentation. Part I. By E. H. Twight and Charles S. Ash. Bull. No. 159.

Univ. of California, Ag'l Exper. Station. California Olive Oil; Its Manufacture. By G. W. Shaw. Bull. No. 158.

Univ. of Arizona, Ag'l Exper. Station. Cost of Pumping for Irrigation. By Sherman M. Woodward. Bull. No. 49.

U. S. Dept. of Agric., Bureau of Soils. Investigations in Soil Fertility. By Milton Whitney and F. K. Cameron. Bull. No. 23.

Univ. of Cal., Dept. of Geology. A New Marine Reptile from the Triassic of California. By John C. Merriam. Bull. Dept. Geol., Vol. 3, No. 21, pp. 419-421.

Maine Agric. Exper. Station. Soy Beans. By Chas. D. Woods and J. M. Bartlett. Feeding Experiments. By Chas. D. Woods. Alfalfa. By Chas. D. Woods. Bull. No. 106, Sept., 1904. Home Mixed Fertilizers. By Chas. D. Woods. Bull. No. 107, Oct., 1904.

Tomo I, No. 5.—Informe Sobre El Temblor del 16 de Enero de 1902 en el Estado de Guerrero. Por los Dres. E. Böse y E. Angermann.—Escudio de una Muestra de Mineral Asbestiforme, procedente del Rancho del Ahuacatillo, Distrito de Zinapecuaro, Estado de Michoacan, Por. el Ing. Juan D. Villarello.

"Parergones del Instituto Geologico de Mexico." Tomo I, No. 4. Estudio de la Teoria Quimica propuesta por El Sr. D. Andres Almaraz para explicar la Formaciön del petroleo de Aragon, Mexico, D. F. Por El Ing. Juan D. Villarello.—El Fierro Meteorico de Bacubirito, Sinaloa. Por El Dr. E. Angermann (Lamina X).—Los Agvas Subterraneos de Amozoc, Puebla. Por El Ingeniero E. Ordonez.

Notes on Structural Materials in Southern California.*

BY THEO. B. COMSTOCK, S. D.

(Read by Title, Section of Geology, Oct. 24, 1904.)

The use of natural products in buildings, foundations and other structures of higher class is annually increasing in Los Angeles and the surrounding country, notwithstanding that concrete has also assumed importance from the boldness with which some engineers and architects have recently brought it into service. But concrete itself is only artificial in a secondary sense. The ultimate constituents are natural mineral products, and one who discusses the subject exhaustively must necessarily take into account the deposits of rock from which the components of cements, mortars and their various combinations are derived.

In this brief paper it is my purpose to confine attention mainly to some particular features of the local natural supply of ready-made building materials, such as granite, marble and the more commonly used building stones. The elements of color, texture, fracture, mineral composition, and even accessibility to market, not to mention just now the durability and suitability in other ways for structural use—all these features have been dependent upon geologic history. That is to say, the geographic distribution, topographic outlines, exposure for working, form of blocks in a given quarry, and the appearance and wearing quality of the rock, as well as the response to tooling and polishing, are not mere chance results. These vary exactly in accordance with conditions antecedent, which can readily be determined and quantitatively estimated by the practical geologist from observations in the field.

A prominent firm who supplied rock upon a contract in Los Angeles started upon the delivery without knowing that their quarry would furnish the needed stint. This risk of loss by failure to comply with their agreement was wholly unnecessary, because a competent geologist could have settled the matter beforehand with moderate study of the ground. There are also certain well-established facts which enable one familiar with the details to determine readily whether any given supply of rock will become useful in the arts. For instance, a grade of marble which is somewhat popular here, although it seriously offends the taste of others, was examined some time ago by the writer and the result of weathering considered dubious.

*There is room only for an abstract here.

The effects predicted have now become prominently objectionable in several instances*

We have some excellent gray granites within ready access, and many of these are tough, fine grained, fairly homogeneous, with texture and mineral components well adjusted for tooling and polishing satisfactorily. But there are areas in which the lines of jointing and faulting and other structural features have so shattered the masses as to make impossible the procuring of suitable blocks for architectural design. Occasionally these deposits may be utilized for rip-rap, rubble masonry and other structures not demanding regular courses. Still, it is not always safe to employ these without careful examination of the local conditions by an expert. Lines of weakness not apparent from cursory observation may, perhaps, be detected in the lay of the deposit or the geologic conditions of the neighborhood. Sometimes mineral streaks giving no evidence of cleavage will afterwards develop fracture lines in actual use. Again, certain minerals, easily oxidized or disintegrated by wear, may, at first, offer an attractive or apparently serviceable surface, which cannot long withstand the influence of city environment.

These features must be judged on the ground by experts familiar not only with the requirements of construction, but also with the geologic and engineering conditions concerned in each particular problem. It is a prevalent opinion that exposures with the rock badly shattered at surface are liable to show improvement in this respect at greater depth. This idea is commonly erroneous, except as it may apply to deposits wheer atmospheric agencies have been responsible for the surface conditions. And, usually, then the bringing of unexposed portions to air will produce similar results. **Per contra,** it is not always certain that surface exposures of wholly satisfactory material will hold out the same in depth, although the chances are, perhaps, more in favor of such occurrence than otherwise.

There are some black granites in the foothills of the San Gabriel Mountains, which ought to find limited use in ornamental work. For parts, or the whole of monuments, and for some decorative purposes, they are valuable on account of their toughness, variegated appearance and susceptibility of polish. They are usually coarse-grained and do not tool as readily, in consequence. There is some variety in these particulars. Some of our local monument dealers are using fine-grained black

*I refer to the staining, really the rusting, of the black minerals along the seams, due to oxidation of the iron-bearing minerals.

granites, which appear to work well, but they are less attractive to most persons.

Red granites are not so common. These must pass muster on more points of criticism, and probably few of those in this neighborhood are really desirable for general application.

Marbles are extremely variable in quality and in appearance. The desire to utilize local material has carried some of our architects beyond the bounds of prudence. Fortunately the uses made of this rock are mainly decorative, which places them wholly in the class of veneering materials, where they can be replaced if found unsatisfactorily. Much of the Catalina marble which has gone into prominent office buildings of late is regarded as **bizarre** by persons of refined taste, but its bold, bad lines might still be forgiven were it not for the inevitable result. It will certainly "paint the town red" in streaks in the districts where it is used. The black markings contain some **ferrous** mineral, which must oxidize to a rusty brown on exposure to the weather, staining the white lime-rock for some inches on either side. This action, aside from the unpleasant discoloration, will develop lines of weakness; and, if carried far enough, the slabs will fracture and separate along these lines. No serious danger threatens, because the thin veneer of marble sustains little besides its own weight, and it can be removed without weakening the building to which it is attached. The white body of this rock is of fair tint and of good grain.

There are some choice marbles in use in Los Angeles which contain black or greenish black streaks of resistant quality. Some of these have withstod weathering agencies for years without discoloration. The determination whether the particular mineral compositon in any given case will be suitable or otherwise is not very difficult; but the test should be applied beforehand. Otherwise, as has been evident locally, time may demonstrate the disadvantage most expensively.

Red granites and red marbles usually contain iron in ferric oxidation, and if they possess the requisite strength, even if streaked with red, there is not usually any liability to change.

The rocks which form the masses of the high mountains in Southern California are not usually such as will attain popularity for building purposes. An experiment in the new California Club building in Los Angeles, using a rock from near Chatsworth, gives hope of substantial success with this substitute for light buff sandstone. It is a fine grained, mixed rock, rather tender in fracture, rubbing smooth without polish, showing little or no difference between exposed and newly fractured surfaces. There are diffused grains of a black mineral, which

might suggest the possibility of reddening later by oxidation. But these specks are scattered so regularly and the rock has apparently been so long exposed, that such result is probably not to be anticipated. If such change should occur, it is very liable to affect the whole surface evenly, which would do us harm unless disintegration were to ensue. This is very improbable.

Within the bounds of the more recent rock series, which form the lowland areas, there are probably some members which may eventually become useful in structural work. But they are generally thin-bedded or too little indurated to be widely serviceable.

We have, however, ample deposits of raw materials suitable for cement and for burning to quick-lime, and these have been capitalized and now constitute important factors in the market supply of structural substances. The manufacture of brick and tile from our local clays has probably not progressed beyond the initial stages of its productive history. Some day there will be a much increased demand for this class of products.

Notes and News

Dr. R. S. Woodward, of Columbia University, was elected President of the Carnegie Institution, by the trustees, December 13th.

An expedition from the Indiana University, under Professors John A. Miller and W. A. Coggshall, will go to Spain to observe the total eclipse of the sun to take place on August 13, 1905.

Luther Burbank has been appointed special lecturer at Stanford. A large grant in furtherance of his masterful researches in plant hybridization has been given him by the Carnegie Institution.

Dr. J. C. Merriam, of the University of California, and Dr. J. C. Branner, of the Leland Stanford Junior University, have both recently returned to the United States from vacation trips to Europe.

The American Institute of Mining Engineers will hold its summer session in 1905, at Victoria, B. C. A special train will leave Chicago June 24th, going direct to Victoria. Following the meeting, an excursion of 21 days by chartered steamer and special trains, will take in Snettisham Bay, Juneau, Skagway, White Horse, Dawson and other Alaskan points, including the Treadwell mines on Douglas Island. Returning to Victoria five days more will be given to British Columbia mining districts. Eastern participants will reach Chicago, upon the return, early in August.

PUBLICATIONS REVIEWED.

The Cementing Power of Road Materials. By Logan Waller Page and Allerton S. Cushman, of Division of Tests, U. S. Dept. Agric., Bur. of Chem. Bull. No. 85. Washington, 1904. Pp. 24, 1 Pl.—A timely and most valuable contribution to an important subject by worthy experimenters. The methods of testing are clearly described and illustrated by cuts in the text. It is demonstrated by their work that the binding quality of road metal is not due to particular chemical elements, but to the degree of hydration. Therefore, it is not practicable to determine the relative values of different rocks, in this respect, by lithologic examination or by mere chemical analysis. A table of tests already made from various widely scattered localities in the United States affords interesting suggestions, but it is too early to draw wholly reliable conclusions as to the geographic distribution of the most suitable road-making materials. Engineers have heretofore given far too little study to this important subject.

The ''Instituto Geologico'' of Mexico continues to send out notes and papers of scientific interest. Vol. I, No. 4 contains a somewhat exhaustive study of a theory upon which Dr. Almarez had predicated the probability of the existence of petroleum in Aragon. Sr. Villarello critically dissects the author's reasoning and concludes that it is inconclusive and inapplicable, and that no evidence of the occurrence of oil there in commercial quantity has been produced. An excellent plate of a large meteorite is given by Dr. Angermann, who describes it, with an interesting account of its discovery, in 1863, and its announcement scientifically, in 1876 and 1889. Dr. Henry A. Ward, of Rochester, N. Y., had it exhumed and he more fully described it in 1902. In Vol. I, No. 5 (titled elsewhere in full), valuable notes on the earthquake of 16th Jan'y, 1902, in Guerrero, are given from studies on the ground by Drs. Bose and Angermann, both diligent workers, whose labors have been earlier announced in the ''Parergones.'' The article on an asbestiform mineral, in the same issue, by Senor Villarello, an engineer of repute, is very thorough. He concludes that this is an aluminum hydrosilicate, allied to the kaolins, approximating montmorillinite, with some physical features of asbestos, from which it materially differs in composition and properties. It does not bear out the hope raised for its application in the arts as a perfect substitute for asbestos, although it has limited usefulness in that direction.

In Dr. Merriam's description of ''A New Marine Reptile From the Triassic'' of Shasta County, there are some points of great technical interest and bearing upon the development of vertebrate types. But, more than this, we have in the discovery and publication a fitting tribute of Miss A. M. Alexander, ''who has not only contributed generously to the financial support of the work on the vertebrates of the Marine Triassic, but was herself the discoverer of the type specimen,'' which has been named in her honor, **Thalattosaurus alexandrae.**

Cost of Pumping for Irrigation, in ten examples selected by Professor Woodward, of the University of Arizona, varied from less than 4 cents to more than 29 cents per acre-foot of water raised one foot. The best results are due to the application of brain power to the problem of adapting the machinery to the duty at hand. In other words, the investigation once more emphasizes the costliness of saving engineers' fees at the start. One plant, with wood at lowest cost per unit, had the greatest cost per unit of power developed, and the greatest cost for attendance, lubricating, repairs, etc., although the duty

required was actually the lowest. An interesting fact brought out is that two pumps at the University of Arizona, operated under practically the same conditions of duty, were very close in performance and costs, one being of reciprocating type, run by steam from wood fuel, the other a centrifugal pump, run by electricity. The cost of the electricity is given at 5 cents per kilowatt-hour, this apparently being the price paid for current to the local electric company. This is not the place to discuss the engineering features, nor does Professor Woodward regard the small number of tests as more than illustrative of a few general principles. But the work is important, and it is to be regretted that the removal of Mr. Woodward to take the professorship of Steam Engineering in the University of Iowa is about to deprive Arizona of his valuable services.

Dr. Calm, well known in Los Angeles, has done good service by his thorough investigations concerning the effects of "Sulphurous Acid and Sulphites as Food Preservatives." His paper cited gives details of his researches, from which his own conclusions follow logically. He decides that these preservatives are harmless, not only because not deleterious in themselves, but because they cannot preserve any but untainted substances; and, if used in excess, the results are such as to give due warning to consumers.

The recent Bulletins of the Agricultural Experiment Station of the University of California evince careful work. The lines of investigation are mainly in directions which need long continued study and comparison. The future importance of the olive oil and wine industries depend upon the solution of just such problems as are now under examination. The laws and methods of fermentation and the effects of temperature and composition are too little understood. New information upon these subjects is continually being brought out by the station workers. Although the immediate practical results are often made the measure of their worth, and here they rarely fail to pay their way, the ultimate gain to pure science is far beyond what many realize.

The Mining Magazine for December is rich in concise, complete, well digested reviews of current progress in mining and metallurgy. The iMning Digest and Mining Index are thorough and well arranged for convenient reference. Among the many periodicals regularly reviewed we find our own **Bulletin of the Southern California Academy of Sciences.**

The deepest well-boring in the United States for oil or gas, according to the Engineering and Mining Journal, is on the Bedell farm, West Elizabeth, Pa., twelve miles southwest of Butler. It has a depth of 5,575 feet, and was completed in 1898. The diameters of casing, from top downward, are: First 40 ft., 10 in.; next 320 ft., 8.25 in.; next 1,000 ft., 6.25 in., the remaining distance (below 1,360 ft.) being an uncased boring of 6.25 in. diameter. The temperatures, as taken by Professor Hallock, of Columbia University, were: At 525 ft., 57 deg. F.; at 2,252 ft., 64 deg. F.; at 2,397 ft., 78 deg. F.; at 5,010 ft., 120 deg. F.; at 5,380 ft., 127 deg. F.

The boring was stopped by accidental loss of string of tools, closing up the last 1,000 feet of the hole.